

A REVISION OF THE *LECANODIASPIS* TARGIONI-TOZZETTI (HOMOPTERA: COCCOIDEA) OF THE ETHIOPIAN REGION

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SYNOPSIS

The females of the ten species of *Lecanodiaspis* Targioni-Tozzetti previously known from Africa south of the Sahara are redescribed, and a further three species are described as new. *Lecanodiaspis mimosae* var. *brachystegiae* Hall is raised to specific rank. A key to the species and comments on their inter-relationships are given. Lectotypes have been designated for six of the previously described species.

INTRODUCTION

THE genus *Lecanodiaspis* was described by Targioni-Tozzetti in 1869 for the type-species *sardoa*. Signoret, in 1870, used both of the two spellings *Lecanodiaspis* and *Lecaniodiaspis*. Although *Lecaniodiaspis* has been used frequently since, it is now generally accepted that the correct spelling is *Lecanodiaspis* (Morrison & Morrison, 1966; Afifi & Kosztarab, 1969; Williams & Kosztarab, 1970).

This study covers the adult females from Africa south of the Sahara; the Malagasy Subregion is excluded. The remaining species from the other zoogeographic regions of the world are currently being studied in the Department of Entomology, Virginia Polytechnic Institute and State University, under the direction of Professor Kosztarab (Howell & Kosztarab, 1972).

The oldest known species from this region is *Prosopophora prosopidis* var. *mimosae* described by Maskell in 1897 from South Africa off *Acacia*. This species was placed in the genus *Lecaniodiaspis* by Cockerell in 1899, and was later very well redescribed by Morrison & Morrison (1927). Newstead described *L. africana* from North Africa in 1911, and *L. tarsalis* from South Africa in 1917. These were followed by Brain in 1920 with three further species from South Africa, *L. brabei*, *L. magna* and

L. natalensis, whilst in 1935, Hall described a new species and a new variety from Rhodesia (*L. parinarii* and *L. mimosae* var. *brachystegiae*). The first and only species so far recorded from Central Africa is *L. erratica* De Lotto described off coffee from Kenya. The most recently described species is *L. elytrapappi* Munting & Giliomee, 1967, again from South Africa. Thus, prior to this revision, nine full species and a variety were known from Ethiopian Africa.

Until 1959, the genus *Lecanodiaspis* was placed in the family Asterolecaniidae Cockerell, on the grounds that it shared with *Asterolecanium* Targioni-Tozzetti 8-shaped pores. However, Borchsenius (1959) placed it in a new family Lecanodiaspididae, along with six other genera (*Psoraleococcus* Borchsenius, *Cosmococcus* Borchsenius, *Anomalococcus* Green, *Amorphococcus* Green, *Mallococcus* Maskell and *Prosopophora* Douglas). He based these findings on adult female characters, separating it from the Asterolecaniidae on the presence of an anal cleft, whilst the 8-shaped pores excluded it from the family Coccidae.

Since the introduction of this group as having family status, additional features have been found which help to support it. Giliomee (1967*a*), whilst discussing the affinities of the male *Lecanodiaspis elytrapappi* Munting & Giliomee, considered that it shared several characters with the males of the family Coccidae, but also some with the Pseudococcidae. Later Giliomee (1968), when discussing the relationships of the male of *Asterolecanium proteae* Giliomee & Munting, considered that the Lecanodiaspididae shared six characters with the family Coccidae and only two with the Asterolecaniidae. He pointed out however, that these findings were tentative, being based on only one male of each genus. In his earlier paper (1967*a* : 194), he drew attention to five characters which he felt might separate the males of Lecanodiaspididae from other groups. Work on the males of other coccid species (more particularly by Theron, 1958, 1962 and 1968; Borchsenius, 1960; Beardsley, 1962; Ghauri, 1962; Giliomee, 1961 and 1967*b*; Afifi, 1967) suggests that the main feature characterising the males of *Lecanodiaspis* is the fusion of the trochanter and femur, and this has been found to be a constant feature in the more recent study of four further species of *Lecanodiaspis* by Afifi and Kosztarab (1970).

Williams & Kosztarab (1970) outlined the characters of the 1st instar nymphs which might be characteristic of this group. These were the 8-shaped pores and anal lobe setae (also found in the Asterolecaniidae), and the anal plates and spiracular spines which, though less developed, are similar to those in the Coccidae.

Further evidence, of a different nature, of a closer relationship between the Lecanodiaspididae and the Coccidae was given by Buchner (1953), who found that the symbionts in *Lecanodiaspis* were quite different from those in the Asterolecaniidae, more closely resembling those in the Coccidae.

There are therefore a number of features of *Lecanodiaspis* which appear to be found either in the Asterolecaniidae or in the Coccidae. Much of this new data suggests that *Lecanodiaspis* and related genera may in fact be nearer the Coccidae than the Asterolecaniidae, and so perhaps they should be given the same status as the other two groups. It is possible that they should all have subfamily status, as many of the differences which were previously thought to separate these families appear to be falling away (Giliomee, 1967*b* : 105). Should it be found, however, that

they are more closely related to the Asterolecaniidae than the above points suggest, then the family-group name Lecanodiaspididae should still be used on the grounds of priority (Williams, 1969).

The following abbreviations of museums and other depositories of insect material are used in this paper.

BMNH	British Museum (Natural History)
MAS	Ministry of Agriculture, Salisbury, Rhodesia
MNHN	Muséum National d'Histoire Naturelle, Paris
NCI	National Collection of Insects, Plant Protection Research Institute, Pretoria
USNM	United States National Museum, Washington

LECANODIASPIS Targioni-Tozzetti, 1869

Lecanodiaspis Targioni-Tozzetti, 1869 : 261. Type-species: *Lecanodiaspis sardoa* Targioni-Tozzetti, by monotypy.

Lecanodiaspis; Signoret, 1870 : 270. [Erroneous subsequent spelling.]

On the basis of the adult females, which appear to be found on the stems and twigs of the host-plants, the genus *Lecanodiaspis* can be distinguished by the following characters.

Adult female covered in a dense protective test; dermis membranous; dorsal surface covered in 8-shaped pores, tubular ducts and simple pores, with rather less frequent setae, which may be of various sizes; cribriform plates present in the abdomen, sometimes extending anteriorly onto the thorax, generally as two slightly diverging lines; anal plates as two triangular plates on the antero-ventral and lateral areas of the anal cleft, each generally with spines and ridges, and with a third plate forming the dorsal anterior margin of the cleft; marginal setae present, often tending to become spinose; stigmatic spines present or absent, when present with two spines in the anterior group, and single spines posteriorly either in one or two groups associated with ventral quinquelocular pore bands; stigmatic clefts absent; eye-spot absent. Ventral surface with a marginal ring of 8-shaped pores similar to the dorsal pores; submarginally, a further ring of smaller 8-shaped pores; within this is a sparse band of minute square-shaped pores, which reach a sub-median line formed by the antennae, coxae and anal plates; throughout the ventral surface are minute simple pores and tubular ducts; multilocular disc pores present around the genital opening, and more anteriorly; quinquelocular pores as pore bands between the spiracles and the margin, sometimes reduced to small groups near the spiracles, with the posterior bands sometimes split into two; spiracles normal; labium one-segmented, with short terminal setae; legs present, reduced or absent, when present with fine tarsal and claw digitules, and no tibio-tarsal articulatory sclerosis; antennae usually well developed, though these may also be much reduced, but the terminal three segments always with stout sensory setae; anal ring with a variable number of anal setae, and with a variable ring of small sclerotized pores; anal cleft well developed, and anal posterior lobes with single long setae and associated short setae.

Lecanodiaspis has a world-wide distribution; although typically a tropical genus, its range extends northwards into southern Europe and the southern part of the U.S.A.

KEY TO THE ADULT FEMALE *LECANODIASPIS* OF THE ETHIOPIAN REGION

- 1 Legs well developed, of at least three segments 2
- Legs reduced to minute stumps or entirely absent 9
- 2 Posterior quinquelocular pore bands divided into two 3
- Posterior quinquelocular pore bands single, or entirely absent 6
- 3 Dorsal setae of two sizes: one minute, the other over 45 μ long
dorsospinosa sp. n. (p. 424)
- Dorsal setae never more than 10 μ long 4
- 4 Dorsal anal plate broad, with two distinct projections posteriorly; cribriform plates restricted to the abdomen *tarsalis* Newstead (p. 442)
- Dorsal anal plate narrow, with no posterior projections; cribriform plates found in the thorax as well as the abdomen 5
- 5 Adult female less than 2 mm long; no small group of multilocular disc pores in the genital segment on either side of the genital opening; antennae less than 200 μ long, and the tibia plus tarsus less than 70 μ long *erica* sp. n. (p. 428)
- Adult female usually longer than 2 mm; with a small group of multilocular disc pores in the genital segment on either side of the genital opening; antennae more than 200 μ long and tibia plus tarsus more than 70 μ long *brabei* Brain (p. 419)
- 6 Posterior quinquelocular pore bands reduced to a small group near the spiracle
elytropappi Munting & Giliomee (p. 426)
- Posterior quinquelocular pore band complete 7
- 7 Cribriform plates in two rows *africana* Newstead (p. 416)
- Cribriform plates in four rows 8
- 8 Femur, tibia and tarsus fused into a single segment; spines on the lateral anal plates found medially *magna* Brain (p. 433)
- Femur not fused with the tibia and tarsus; spines on the anal plates found subterminally *zygophylli* sp. n. (p. 445)
- 9 Posterior quinquelocular pore bands divided into two 10
- Posterior quinquelocular pore bands single or reduced 11
- 10 Stigmatic spines restricted to the anterior group only; stigmatic spines of approximately equal length *mimosae* (Maskell) (p. 435)
- Stigmatic spines found associated with each stigmatic band; anterior stigmatic spines of very unequal lengths *parinari* Hall (p. 440)
- 11 Cribriform plates absent, or found in two distinct rows diverging slightly from the anal cleft over the abdominal segments 12
- Cribriform plates in a single group medially in the abdomen, though this may be in two adjacent rows *erratica* De Lotto (p. 431)
- 12 Antennae reduced to five annular ring-like segments; with four pairs of setae in the anal ring *natalensis* Brain (p. 438)
- Antennae of eight or nine segments; with five pairs of setae in the anal ring
brachystegiae Hall (p. 422)

DESCRIPTIONS OF THE SPECIES

Lecanodiaspis africana Newstead, 1911

(Text-fig. 1)

Lecanodiaspis africana Newstead, 1911 : 100. LECTOTYPE ♀, EGYPT, on *Acacia arabica* (BMNH), here designated [examined].

Lecanodiaspis africana Newstead; Hall, 1922 : 7.

Lecanodiaspis africana Newstead; Hall, 1923 : 33.

Lecanodiaspis africana Newstead; Hall, 1925 : 18.

Lecanodiaspis africana Newstead; Hall, 1926 : 29.

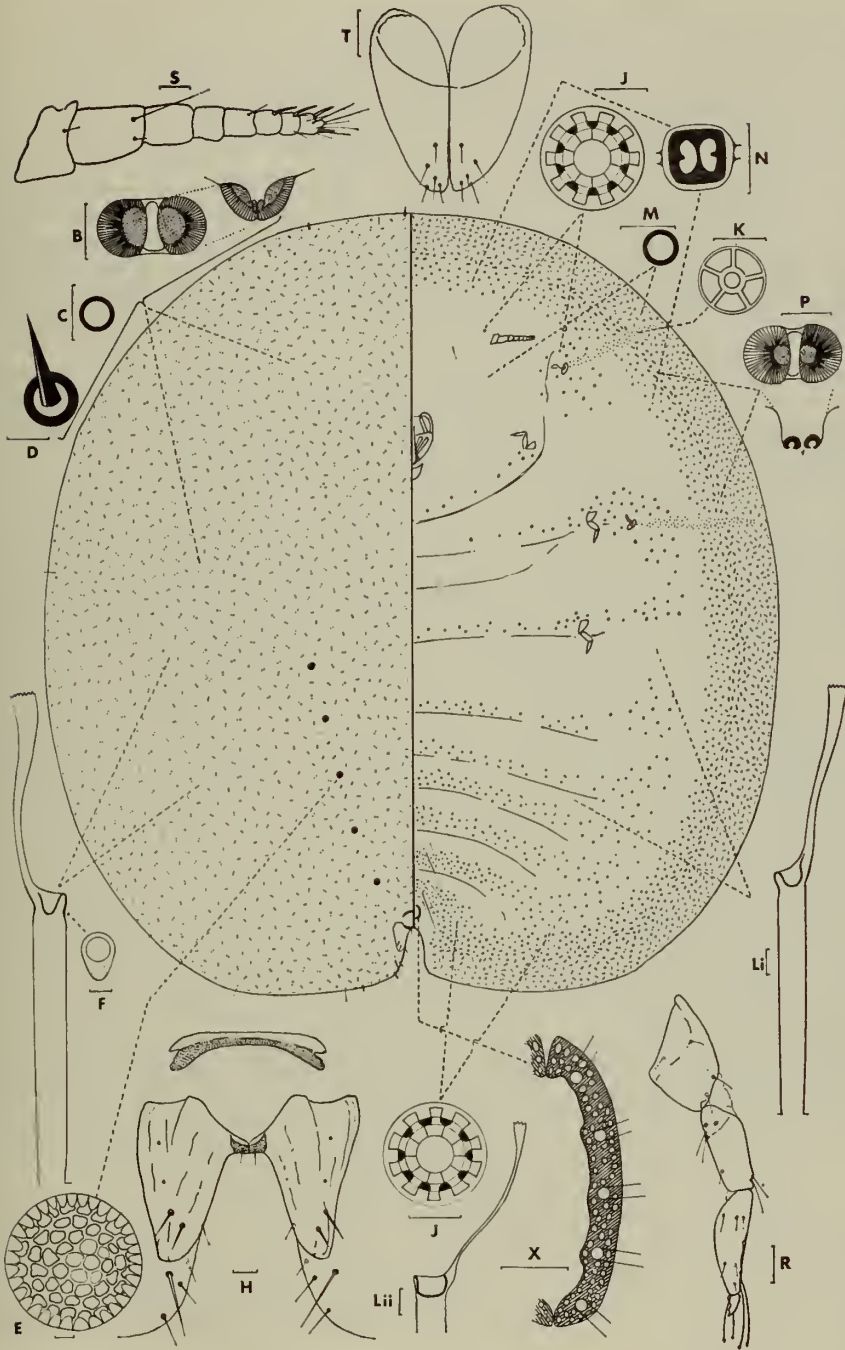


FIG. 1. *Lecanodiaspis africana* Newstead.

Lecaniodiaspis africana Newstead; Hall, 1927a : 160.

Lecaniodiaspis africana Newstead; Hall, 1927b : 266.

Lecaniodiaspis africana Newstead; Balachowsky, 1934 : 148.

Lecaniodiaspis africana Newstead; Bodenheimer, 1935 : 260 & 270.

Lecaniodiaspis africana Newstead; Afifi & Kosztarab, 1969 : 12.

Lecaniodiaspis africana Newstead; Williams & Kosztarab, 1970 : 23.

'Female ovisac—very closely felted and almost waxlike in appearance. Cream-buff or straw-coloured, becoming greyer after long exposure. Form short ovate and very highly convex; posterior half with a faint trace of a short median ridge, but this is, in old examples, more or less broken up into a series of transverse ridges, varying in intensity according to the age of the individual, but in all cases they are interrupted centrally, and in old examples they are often represented merely by minute tubercular projections. Average length, 5 mm; width, 3.5 mm.' (Newstead, loc. cit.)

Mounted material 3.0–4.0 mm long, and almost circular. Dorsal surface membranous, and covered in (i) numerous 8-shaped pores (B) (with those marginally a little larger than elsewhere), (ii) tubular ducts (F), (iii) minute simple pores (C), and (iv) (much less numerous) minute dorsal setae (D). In the abdomen, diverging from the anal opercular, are two rows of cribriform plates (E), normally five per row, each with very numerous pores; they appear to be concave. Anal plates (H) moderately sclerotized, 132–160 μ long, not heavily ridged, and with two stout setae sub-apically; with 1–3 small pores medially; dorsal plate rather narrow, though possibly bifid laterally. Marginal setae rather few and finely setose laterally, though with a few spinose setae present at the anterior and posterior ends. Stigmatic spines entirely absent.

Ventral surface membranous, with multilocular (10) disc pores (J) abundant around the genital opening and in all the preceding abdominal, thoracic and cephalic segments, becoming scarcer anteriorly, but with concentrations near the bases of the legs and near the spiracles; the rows of pores broadening laterally. Quinquelocular pores (K) in broad bands from the spiracles to the margin, where the lines end abruptly; the posterior band is undivided. Spiracles normal though rather small, with the width of the anterior opening about 65 μ . Throughout the ventral surface are minute simple pores (M), though these are more frequent marginally, and ventral tubular ducts of two types: immediately posterior to the genital opening is a small group of ducts (Lii) similar to those elsewhere except that the outer ductule is a little broader, and the inner ductule a little thinner; elsewhere the ducts (Li) are similar to the dorsal ducts but a little smaller. Marginally, the dorsal 8-shaped pores (B) become rather more frequent than dorsally, forming a rather narrow marginal band; within this is a further band 3–4 pores wide, of ventral 8-shaped pores (P); whilst inside this is a band of square-shaped pores (N); these bands extending to between half and two-thirds of the distance from the margin to the spiracles. Setae rather sparse on the ventral surface, with one pair between the antennae, single pairs of rather long setae in the last pregenital segments, and supplemented on the last two segments by groups of small setae. Legs (R) rather small, with a tendency for the fusion of the trochanter and femur, and of the tibia and tarsus; with a distinct denticle on the claw, and with minutely knobbed digitules; dimensions (iii): trochanter plus femur 70–82 μ , tibia plus tarsus 64–72 μ . Antennae (S) also rather small, of eight segments, 225–250 μ long, with some fairly long fine setae apically. Labium (T) one-segmented, 85 μ long, with five pairs of small terminal setae. Anal ring (X) heavily sclerotized with three parallel rows of small pores and ten anal setae evenly spaced around the anal ring. Anal cleft (H) with one pair of small setae at the anterior end, and with a small pair laterally; the anterior end is heavily sclerotized, joining the lateral anal plates. Posterior lobes (H) with three small setae, and one pair of relatively long setae (26–30 μ).

Redescribed from the following material labelled *Lecaniodiaspis africana* Newst., ? Antonina Africana:

Lectotype ♀, EGYPT: Ezbet et Nakhl, on 'Sunt' (*Acacia arabica*) (Leguminosae), Nov. 1909 (*Willcocks*), (R.N., May 1911), BMNH 1945, 121.

Paralectotypes. Data as for lectotype, 4 ♀ on 4 slides, BMNH 1945, 121.

Also seen, though not used in the above redescrptions:

NIGERIA: Kano, on *Acacia* sp., 8.ii.1962 (*W. J. Hall* (28)), BMNH. SUDAN: Medani, on *Ficus benghalensis* (Moraceae), 8.iii.1938 (*H. W. Bedford*), IIE 129, BMNH 1958, 578 (labelled *Lecanodiaspis* nr *magna* Brain). MALI ('Soudan'): locality not stated, ex *Acacia* sp., 30.v.1922 (*J. Mimeur*), MNHN. MAURITANIA: Agadès, Sahara soudanais, ex *Acacia* sp., July 1947 (*L. Chopard*), MNHN.

Also from Africa, though not quite within the Ethiopian Region:

ALGERIA: Hoggar, Oued Arak (Mouydir), ex *Acacia seyale*, March 1928 (*P. de Peyerimhoff*), MNHN; Hoggar, Pied est Tifedest, ex *Acacia tortalis*, 12.iv.1928 (*R. Maine*), MNHN. LIBYA: Fezzan, Bir Abaceur, 40 km north Rhat, ex *Zizyphus* sp. (Rhamnaceae), 23.iii.49 (*A. Balachowsky*), MNHN; Fezzan, 30 km north Rhat, ex *Acacia* sp., 28.iii.1949 (*A. Balachowsky*), MNHN.

The rest of the material differed from the type-series in the following characters: there was a reduction in the number of multilocular disc pores anteriorly, becoming rather scarcer near the anterior spiracle and near the antennae; the marginal spines at the anterior and posterior ends tended to become more spinose in some cases; occasionally the number of cribriform plates was reduced, in one case to four pairs; some of the dimensions differed and the total ranges of the antennae were 225–296 μ , with a tendency for segment two to become more annular in the shorter antennae; also the trochanter plus femur was 52–82 μ , and the tibia and tarsus 56–80 μ ; the anal plates 130–171 μ .

This species is probably most closely related to *L. magna* and *L. zygophylli*, but is immediately separable from them in having only two rows of cribriform plates. Apart from this, *L. zygophylli* and *L. africana* are almost identical in the adult female, but the 1st instar nymphs also differ, the former species having three quinquelocular pores in the anterior pore bands, whilst the latter species has only two (*Williams & Kosztarab*, 1970 : 23). The main characters of these three species appear to be: (i) the complete lack of stigmatic spines; (ii) the undivided posterior band of quinquelocular pores; (iii) the multilocular disc pores tending to be found commonly in the thorax as well as the abdomen; (iv) the eight-segmented antennae; (v) marginal setae that tend to become more spinose anteriorly and posteriorly; (vi) anal ring with five pairs of anal setae, and three rows of small pores; (vii) legs normally developed, but small, with a tendency for fusion of the segments; (viii) anal plates not usually heavily ridged; and (ix) the tubular ducts posterior to the genital opening lacking the swollen base to the inner ductule.

Lecanodiaspis brabei Brain, 1920

(Text-fig. 2)

Lecanodiaspis brabei Brain, 1920 : 117. LECTOTYPE ♀, SOUTH AFRICA, on *Brabeium stellatifolium* (USNM), here designated [examined].

Lecanodiaspis brabei Brain; Afifi & Kosztarab, 1969 : 18.

Lecanodiaspis brabei Brain; Williams & Kosztarab, 1920 : 33.

Test of the adult ♀ about 3.2 mm long, 2 mm wide, and 1.5 mm high, oval convex, ochre yellow, with a thin covering of greyish secretion which is easily flaked off. The dorsum is not

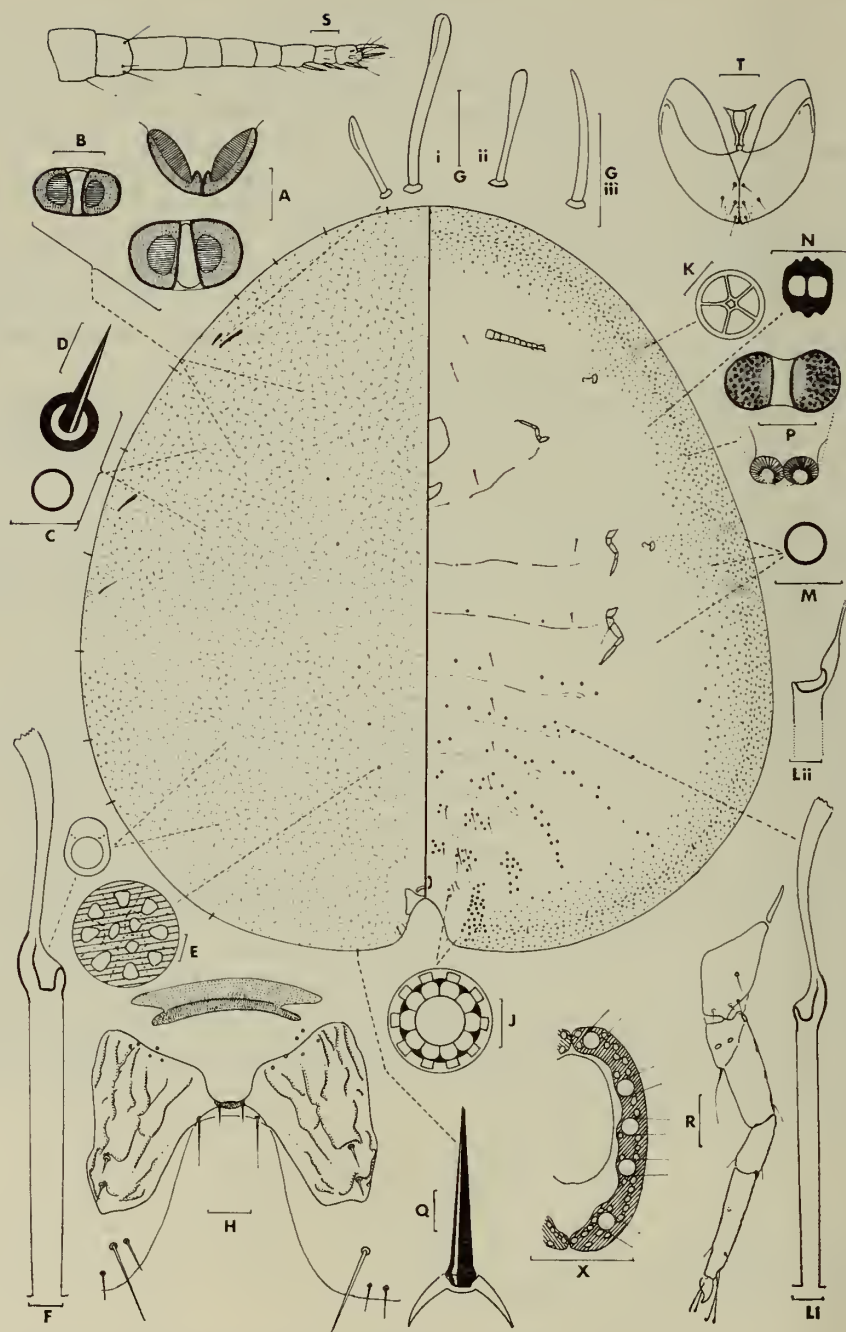


FIG. 2. *Lecanodiaspis brabei* Brain.

quite smooth, but has faint rounded rib-marks and occasionally a faint median ridge. With the roughened secretion removed the colour and general appearance of this species is very like the figure Green gives of his *L. azadirachtae*, '♂ puparium of the usual type, pale buff coloured, not yellow as in the female test.' (Brain, loc. cit.)

Mounted material oval, tending to be broader at the posterior end, and 1.4–3.0 mm long. Dorsal surface membranous, covered in 8-shaped pores of two sizes, the larger (A) being much more common than the smaller (B), which is apparently found intersegmentally. Also throughout the dorsal surface are minute simple pores (C), tubular ducts (F), and rather infrequently minute dorsal setae (D). Two slightly diverging lines of 5–6 cribriform plates are present over the anterior abdominal segments and the thorax, each plate with 7–20 pores. Anal plates (H) distinctly ridged longitudinally, with two sub-apical setae, and with a group of 3–7 small pores near the anterior margin; length 90–110 μ ; dorsal plate rather narrow, and generally broadest medially. Marginal spines about 12 per side, with rather large basal discs; length 13–19 μ . Stigmatic spines present (G), with two spines in the anterior group (lengths 40–75 μ and 15–26 μ) and single spines associated with each of the posterior pore bands (25–43 μ and 28–40 μ long respectively); all have rather spatulate ends.

Ventral surface membranous, with multilocular (I) disc pores (J) in a small group on either side of the genital opening, and frequent in all the preceding abdominal segments; there are also a few medially in the metathoracic segment and occasionally in the mesothorax. Quinquelocular disc pores (K) in broad bands between the spiracles and stigmatic spines, the pores most frequent marginally, where the bands narrow towards the spines. Throughout the ventral surface are minute simple pores (M), which are rather sparse medially, and ventral tubular ducts of two sorts: immediately posterior to the genital opening is a small group of ducts (Lii) similar to those elsewhere except that the outer ductule is a little broader, and the inner ductule a little thinner with a broadened base; elsewhere the ducts (Li) are similar to those dorsally, but a little smaller. Forming a narrow marginal band are the larger dorsal 8-shaped pores (A); just within this is a band of ventral 8-shaped pores (P), 2–3 pores wide, whilst within this is a scattered band of square-shaped pores (N), which occur medially for about 2/3rds of the length of the stigmatic pore bands. Spiracles normal, width of anterior opening 29–34 μ . Long setae are present as two pairs between the antennae, and there is a pair medially in each of the abdominal segments and associated with the bases of all the legs; smaller setae are found in a submarginal ring, and there are several pairs in each of the last two pregenital segments. Legs (R) relatively small, with the tibia about half the length of the tarsus, with a very small denticle on the claw (often very difficult to see), and fine digitules; dimensions (iii): trochanter plus femur 60–74 μ , tibia plus tarsus 78–90 μ . Antennae (S) of nine segments; all fine terminal setae rather short; length 218–260 μ . Labium (T) one-segmented, with four pairs of small terminal setae; length 72–84 μ . Anal ring (X) heavily sclerotized, with one to two rows of small pores, and ten anal setae, fairly evenly spaced around the ring. With two pairs of setae along the anterior margin of the anal cleft (H), about evenly spaced; with a small area of dense sclerotization joining the two lateral anal plates. Posterior lobes (H) with 3–5 pairs of short setae, and a pair of fairly long setae (28–40 μ).

Redescribed from the following material labelled *Lecanodiaspis brabei* Brain:

Lectotype ♀, SOUTH AFRICA: Newlands, Cape Province, ex *Brabeium stellatifolium* (Proteaceae), Dec. 1915 (C.K.B.) 298, USNM 39 2836.

Also used for above redescription:

SOUTH AFRICA: Cape, Villiersdorp, ex Wild Almond (*Brabeium stellatifolium*), Sept. 1932 (F. A. Fouché per H. K. Monro), 8 ♀ on 3 slides, BMNH.

Also seen:

SOUTH AFRICA: Cape Province, on Wild Almond, 18.v.1906 (T.F.D.), 5 ♀ on 1 slide, C.K.B., USNM; Cape No. 1274 (note: this slide is marked 'Paratype', although no holotype was designated by Brain; also, according to Brain (1920: 118), this

Cape No. was given to another slide, or lot of material, although this slide is clearly marked 1274); Stellenbosch, ex *Brabeium stellatifolium*, 17.v.67 (V.B. Whitehead), NCI; Cape Province, Thorngrove Rail, ex *Tecoma* sp. (Bignoniaceae), May 1946 (W.G. Leppan), BMNH; also a slide labelled *Lecanodiaspis capensis* Brain (a manuscript name), ex coll. Dept. Agric. Pretoria, 10.xi.28, det. Brain, BMNH.

L. brabei is one of a group of rather closely related species from Southern Africa, which includes *L. brabei*, *L. dorsospinosa*, *L. erica*, *L. elytropappi* and *L. tarsalis*. The main characters of these species appear to be: (i) two sizes of dorsal 8-shaped pores, the smaller generally found intersegmentally; (ii) cribriform plates in two rows, with relatively few pores; (iii) posterior stigmatic pore bands divided, each with a stigmatic spine; (iv) marginal setae spinose, with large basal discs; (v) fairly well ridged anal plates; (vi) nine-segmented antennae; (vii) multilocular disc pores very scarce anterior to the abdomen; (viii) legs relatively short, with the tibia much shorter than the tarsus; (ix) the anal ring with five pairs of anal setae, and with one complete and one incomplete row of small pores; (x) the labium with two median areas of dense sclerotization; and (xi) posterior lobes with generally rather few of the short setae.

The material from *Tecoma* sp. tended to be a little larger, and the cribriform plates had up to 25 pores per plate; otherwise it was very similar. The differences from *L. erica*, which is very close to *L. brabei*, are discussed on p. 429.

Lecanodiaspis brachystegiae Hall, 1935, stat. n.

(Text-fig. 3)

Lecanodiaspis mimosae var. *brachystegiae* Hall, 1935 : 219. Holotype ♀, RHODESIA, on *Brachystegia* sp. (BMNH) [examined].

No dried material available, and the original short description by Hall does not include a description of the unmounted material.

Mounted material rather square in shape, and 2.5–3.0 mm long. Dorsal surface membranous, with 8-shaped pores found throughout the dorsal surface, those nearer the margin being a little larger than medially; also found throughout the dorsal surface are minute simple pores (C), and tubular ducts (F), which have the outer ductule internally ridged. Minute dorsal setae (D) are found very sparsely. Five pairs of cribriform plates (E) present in two slightly diverging lines medially in the abdominal segments; they are irregular in shape, very concave, and with numerous pores per plate. Anal plates (H) normally developed, with rather few longitudinal ridges; with two small pores antero-laterally, and with two stoutish spines postero-laterally (occasionally there is a third seta as well); length 104–130 μ ; dorsal plate rather narrow and semicircular, Marginal setae spinose, about 17 per side with small basal discs. Stigmatic spines entirely absent.

Ventral surface membranous, with multilocular (10) disc pores (J) around the genital opening and in all the preceding abdominal segments; they are also found sparsely in the thorax and head. Quinquelocular disc pores (K) rather few, in a very narrow band just reaching the margin anteriorly, but posteriorly restricted to a small group 14–20 near the spiracle, just reaching the band of ventral 8-shaped pores laterally. The dorsal 8-shaped pores form a marginal band of moderate width; within this is a band of ventral 8-shaped pores (P) about 3–4 pores wide. Between this and an imaginary line formed by the antennae, legs and anal plates is a band of square-shaped pores (N). Ventral tubular ducts of two types: immediately posterior to the

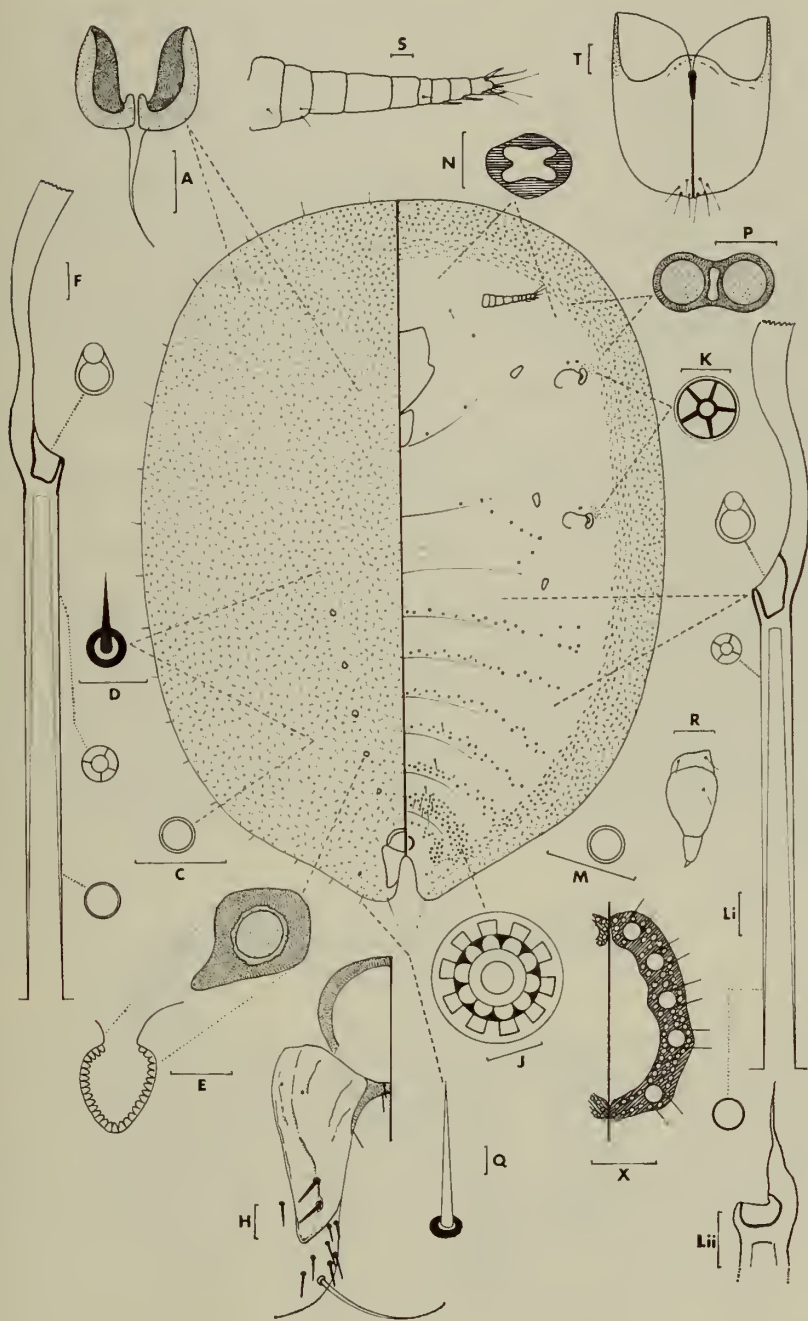


FIG. 3. *Lecanodiaspis brachystegiae* Hall.

genital opening is a small group of ducts (Lii) similar to those elsewhere, except that the outer ductule is a little broader and the inner ductule a little thinner with a broadened base; elsewhere the ducts (Li) are similar to the dorsal ducts, but a little smaller. Minute simple pores (M) are found throughout, but are very sparse medially. Ventral setae rather few, with a single pair between the antennae, about six to eight pairs in the pregenital segment, and single pairs in the preceding two segments; there is also a very sparse submarginal ring of small setae. Spiracles normal; width of anterior opening 39–46 μ . Antennae (S) of nine segments, with a tendency for some segments to become annular; terminal fine setae all rather short; length 218–278 μ . Legs (R) minute, reduced to 1–3 segments, possibly occasionally entirely absent; with a small claw, but no digitules. Labium (T) of one segment, rather elongate, with four pairs of short terminal setae; length 130–144 μ . Anal ring (X) with ten anal setae, and composed of three more or less complete rows of small pores. Anal cleft (H) with an area of dense sclerotization joining the lateral anal plates on which there is a small pair of setae, with another pair laterally (there is also another small pair between the cleft and the genital opening). Terminal lobes with a single pair of long setae (73–90 μ long), and with 6–8 pairs of shorter setae.

Redescribed from the following material labelled *Lecanodiaspis mimosae* var. *brachystegiae* Hall:

Holotype ♀, RHODESIA: Salisbury, The Kopje, on *Brachystegia* sp. (Leguminosae), 23.xi.27 (W. J. Hall (127)), BMNH 1936, 632.

Paratypes. 3 slides and six specimens with same data as Holotype, BMNH.

The main differences between *L. mimosae* and *L. brachystegiae* are: (i) the complete absence of stigmatic spines in *brachystegiae*; (ii) the extreme reduction of the posterior stigmatic pore bands to a small group of pores near the spiracle; (iii) the shape of the labium, which is very much more elongate in *brachystegiae*; (iv) the form of the cribriform plates, which are convex in *mimosae* and concave in *brachystegiae*, and (v) the ventral 8-shaped pore band is rather wider in *brachystegiae* than in *mimosae*. They are however closely related, and appear to fall into a group which also contains *L. erratica* and *L. natalensis*. The main characters of this group are given under *L. mimosae*.

Lecanodiaspis dorsospinosa sp. n.

(Text-fig. 4)

'The specimens were exactly the colour of the bark, and as they were young adults which had not yet secreted a covering, they were very flat.' (J. Munting, personal communication.)

Dorsal surface membranous, with two sizes of 8-shaped pores—the larger (A) in a narrow band marginally, and in a median line from which short branches run laterally about half way to the margin; elsewhere the dorsal surface is covered in the smaller type of 8-shaped pore. Also found throughout the dorsal surface are minute simple pores (C), and fairly large tubular ducts (F). There are also the usual rather sparse minute setae (Di), but in addition, there are some very long spinose setae (Dii), 28–50 μ long, with large basal discs—these are found in two rows medially, and also in no particular pattern laterally. Cribriform plates (E) more or less circular, with 10–15 pores, and present in two parallel rows of 7–8 plates in the thorax and first five abdominal segments. Anal plates (H) well sclerotized, 102–105 μ long, quite richly ridged, with two stout setae towards the posterior end, with a small group of pores near the anterior edge, and with one also present towards the centre of the plates; dorsal plate normal. Stigmatic spines present, associated with all the stigmatic pore bands, with two anteriorly (G), lengths 43–45 μ

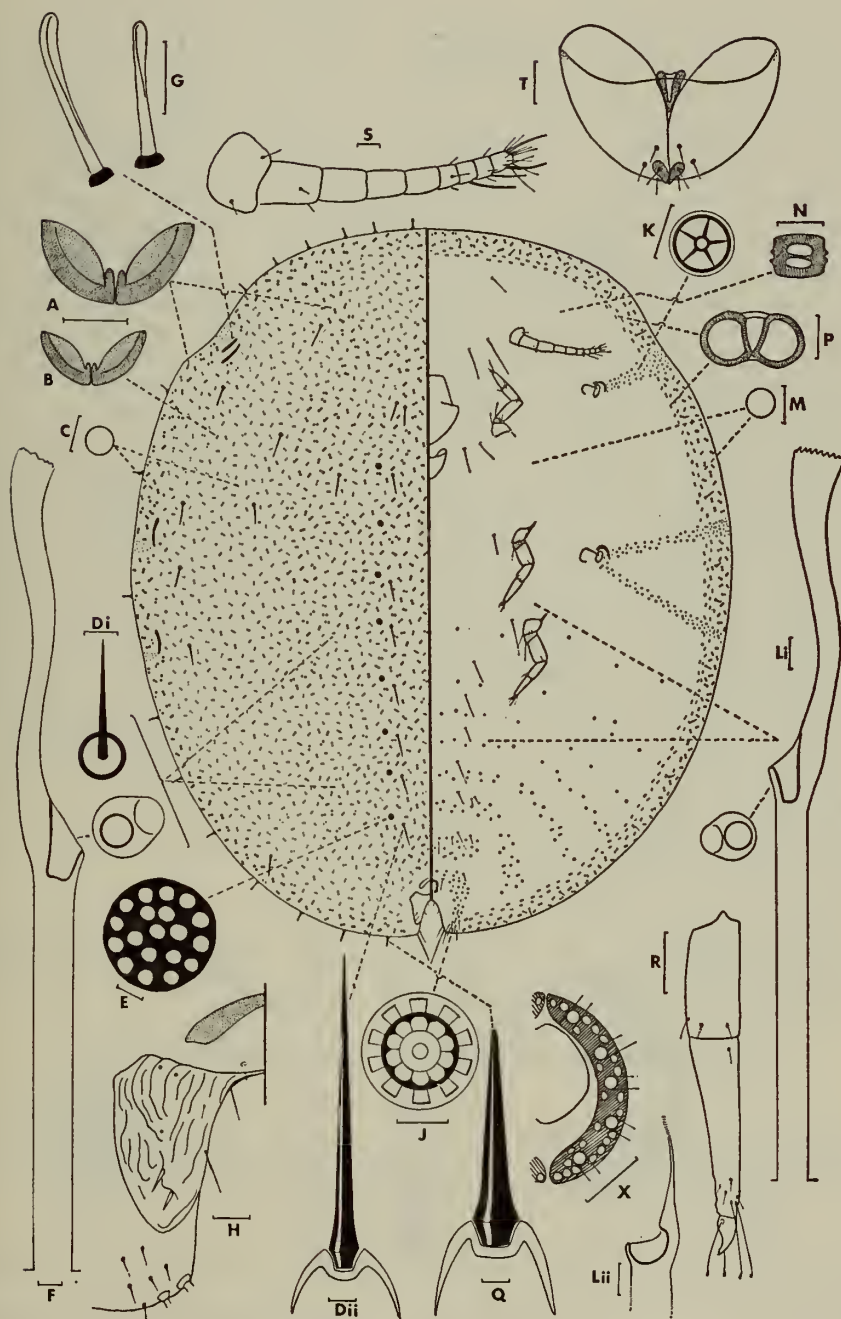


FIG. 4. *Lecanodiaspis dorsospinosa* sp. n.

and 49 μ respectively, and singly posteriorly associated with each of the divided pore bands, 49–52 μ and 49 μ respectively; they all have slightly spatulate ends. Marginal setae (Q) large, spinose, with well developed basal discs, length 23–26 μ ; there are 14–16 per side.

Ventral surface membranous, with multilocular (10) disc pores (J) around the genital opening and in all the preceding abdominal segments, and in the metathorax; there is a tendency for the number of loculi to fall off anteriorly. Quinquelocular disc pores (K) in the normal stigmatic bands, the posterior band divided into two; the anterior band is broader, and the pore frequency increases towards the margin in all bands. The larger dorsal 8-shaped pores form a narrow marginal band, whilst inside this is a very narrow band of ventral 8-shaped pores (P) about two pores wide; between this band and an area roughly marked by the legs, antennae and anal plates is a band of minute square-shaped pores (N). Throughout the ventral surface are minute simple pores (M), which are most frequent marginally, and ventral tubular ducts of two types: immediately posterior to the genital opening is a small group of ducts (Lii) similar to those elsewhere except that the outer ductule is a little broader and the inner ductule a little thinner with a broadened base; elsewhere the ducts are similar to the dorsal tubular ducts, though a little smaller. Spiracles normal, though tending to become surrounded by an area of dense sclerotization; width of the anterior spiracular opening 31–33 μ . Ventral setae often unusually long, found as a single pair anterior to the antennae, two pairs between the antennae, and two pairs associated with the anterior coxae; there are also single pairs associated with the other coxae, and medially in each of the abdominal segments; much smaller setae are found medially in the last three pregenital segments; they also form a submarginal ring, and are found sparsely throughout the rest of the ventral surface. Antennae (S) nine-segmented, with the distal stout setae unusually long, but the finer setae all rather short; length 258–290 μ . Legs proportionately a little small, with no tibio-tarsal articulatory sclerosis, with a small denticle on the claw, and with fine digitules; dimensions (iii): trochanter plus femur 102–104 μ ; tibia plus tarsus (R) 92–102 μ . Labium (T) one-segmented, with four pairs of small terminal setae; length 72–85 μ . Anal ring (X) well sclerotized, with one complete and one incomplete ring of small pores, and with ten long anal setae. With only a small area of dense sclerotization joining the lateral anal plates, with a pair of long setae associated with it, and another pair laterally (H). Each posterior terminal lobe (H) probably with two pairs of long setae, though these are only represented by their basal discs in the available material; associated with them are 4–6 pairs of smaller setae.

Holotype ♀, SOUTH AFRICA: Transvaal, 23 miles south of Barberton, on *Ziziphus mucronata* (Rhamnaceae), 24.iii.1968 (S. Slater), NCI.

Paratypes, SOUTH AFRICA: Transvaal, 23 miles south of Barberton, on *Ziziphus mucronata*, 24.iii.1968 (S. Slater), 3♀ on 3 slides, NCI.

This species is immediately separable from all other species of *Lecanodiaspis* known from Africa by the very long dorsal setae. It falls into the *L. brabei*–*L. tarsalis* group, whose characters are given under *L. brabei*.

Lecanodiaspis elytropappi Munting & Giliomee, 1967

(Text-fig. 5)

Lecanodiaspis elytropappi Munting & Giliomee, 1967: 102. Holotype ♀, SOUTH AFRICA, Ceres, ex *Elytropappus rhinocerotis*, 23.i.1965, (J. H. Giliomee) (NCI).

Lecanodiaspis elytropappi Munting & Giliomee; Giliomee, 1967a: 185.

‘Test of fully mature female oval, dirty-white in colour, about 3 mm long and 1.3 mm wide; male puparia elongate, about 1 mm in length and similar in colour to that of the female.’ Munting & Giliomee, loc. cit.)

Mounted material 1.1 mm long, and elongate oval. Dorsal surface membranous, and covered in 8-shaped pores of more or less two sizes, arranged so that the larger pores (A) are found along

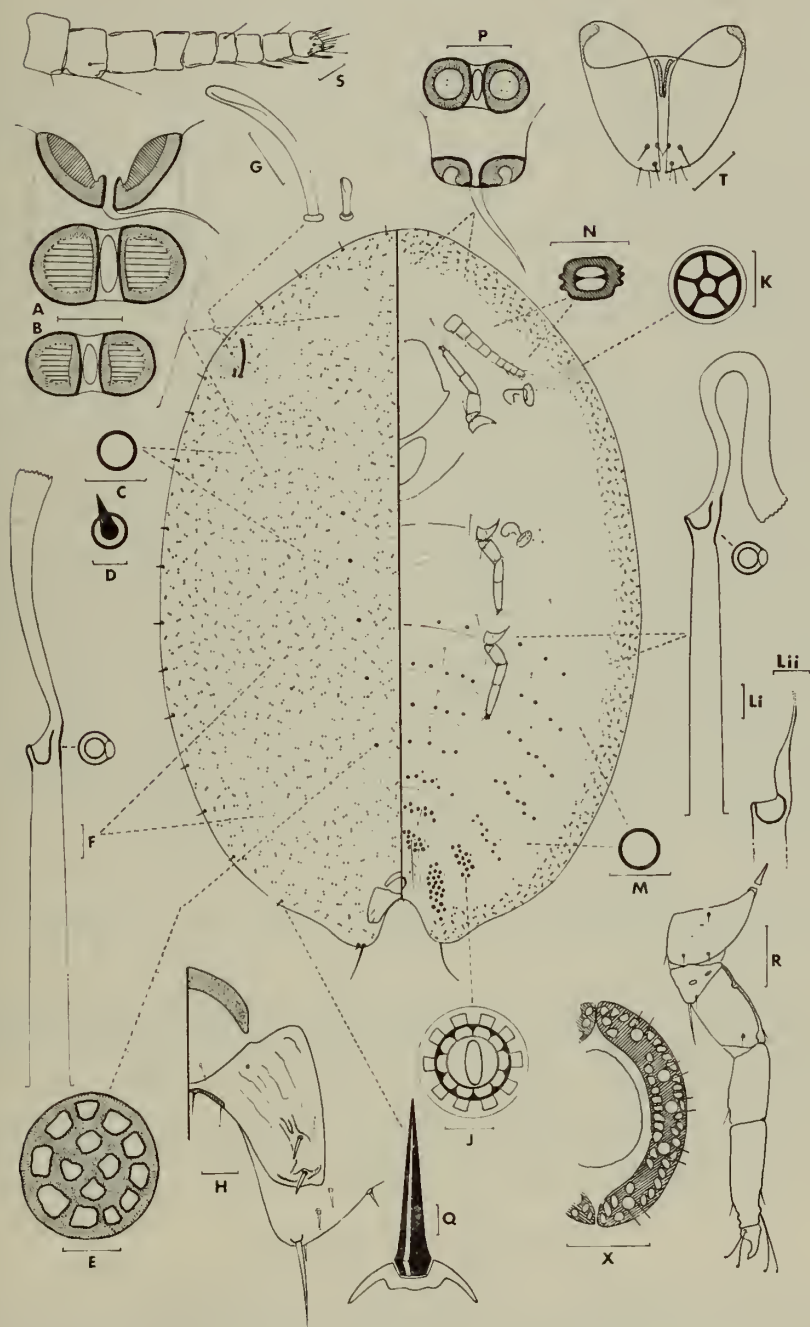


FIG. 5. *Lecanodiaspis elytropappi* Munting and Giliomee.

the ridges of the segments, and the smaller pores (B) lying between. Also found throughout the dorsal surface are minute simple pores (C), tubular ducts (F), and rather infrequently, minute dorsal setae (D). In two median almost parallel lines are 5–8 cribriform plates (E), lying over the thoracic and anterior abdominal segments, each with 9–15 pores. Anal plates (H) with rather few well sclerotized ridges, with a small pore anteriorly and two stout setae posteriorly; length of plates 110–113 μ ; dorsal anal plate rather narrow. Marginal setae (Q) sharply spinose, well developed with large basal discs, with 16–18 per side; length 10–12 μ . Stigmatic spines (G) restricted to the anterior cleft, with one larger spine (61–63 μ) and a rather shorter spine (8–12 μ), both with spatulate ends.

Ventral surface membranous, with multilocular (10) disc pores (J) in the pregenital segment, and in all the preceding abdominal segments, and in the metathorax. Quinquelocular pores (K) in a well developed band between the anterior spiracle and the stigmatic spines, the pores being most frequent marginally; the posterior band is reduced to a small group of 4–9 pores in the immediate vicinity of the spiracle. Throughout the ventral surface are minute simple pores (M), which become rather scarce medially, and ventral tubular ducts of two sorts: immediately posterior to the genital opening is a small group of ducts (Lii) similar to those elsewhere except that the outer ductule is a little broader and the inner ductule a little thinner with a broadened base; elsewhere the ducts are similar to the dorsal ducts, but a little smaller. The larger dorsal 8-shaped pores (A) form a narrow marginal band; within this is a very narrow band about two pores wide of ventral 8-shaped pores (P). Between this and the spiracles is a scattered band of minute square-shaped pores (N). Spiracles normal, with the anterior spiracular opening 28–31 μ wide. Large ventral setae present as 3–4 between the antennae, a pair near the coxae of the legs and medially in all the abdominal segments—that of the pregenital segment being particularly long; shorter setae are found in a submarginal ring, and in a second ring about level with the spiracles; they are also present in small groups in the last four pregenital segments. Labium (T) one segmented, 73 μ long, with five pairs of small terminal setae. Legs (R) relatively small, with no tibio-tarsal articulatory sclerosis, with a distinct denticle on the claw, and with fine digitules; dimensions (iii): trochanter plus femur 49–53 μ , tibia plus tarsus 67–70 μ . Antennae (S) nine-segmented, (occasionally 8, with a pseudo-articulation in the sixth segment); length 208–212 μ ; with all the fine setae on the terminal segment short. Anal ring (X) well sclerotized, with two rows of small pores and with ten anal setae. Anterior margin of the anal cleft between the lateral anal plates not very heavily sclerotized, with two pairs of setae. Posterior lobes with three pairs of short setae, and one fairly long pair (46–49 μ).

Redescribed from 2 slides with 2 paratype specimens labelled *Lecanodiaspis elytropappi* Munt. & Gil., from:

SOUTH AFRICA: Cape, Ceres, ex *Elytropappus rhinocerotis* (Compositae), 23.i.65 (J. H. Giliomee), BMNH.

This species belongs to the *L. brabei*–*L. tarsalis* group, the main characters of which are given under *L. brabei*. It differs from the others in the restriction of the stigmatic spines to the anterior group, and the reduction of the posterior pore bands to around the spiracle only.

Munting and Giliomee also described the male, and Giliomee (1967a) subsequently discussed its relationships within the Coccoidea.

Lecanodiaspis erica sp. n.

(Text-fig. 6)

A rather small species, 1.5 mm long, 1.1 mm wide and 0.75 mm high, and a pale biscuit colour in dried material. The tests are roughly oval in shape, perhaps slightly blunt anteriorly, and drawn out posteriorly, where there is a small cleft, which is turned upwards; the tests are

convex dorsally, with a small distinct dorsal ridge, and with indications of minute ridges running laterally. The available material is off the twigs and small branches of the host plant.

Mounted material 1.1–1.8 mm long. Dorsal surface membranous, with 8-shaped pores (A & B) throughout, with the smaller pore apparently lying intersegmentally. Also throughout the dorsal surface are minute simple pores (C), and tubular ducts (F); much less frequently are some minute dorsal setae (D). Cribriform plates (E) in two parallel lines medially over the abdomen and posterior thoracic segments, with 3–6 in each row; with 25–26 pores in each plate. Anal plates (H) fairly well sclerotized, with several well formed ridges, and two pairs of sub-terminal stout setae; with three small pores anteriorly in each plate; length of plates 102–116 μ ; dorsal plate well sclerotized, fairly narrow, and possibly bifid laterally. Marginal setae (Q) spinose, 8–15 μ long, shorter towards the anterior end, and with only moderately well developed basal discs; with 13–15 per side. Stigmatic spines (G) present, with a long, slightly spatulate, blunt spine (49–68 μ long) and a very short spine (11–16 μ long) associated with the anterior pore bands; the posterior two pairs of spines also have spatulate ends, and are 34–49 μ long.

Ventral surface membranous, with multilocular (10) disc pores (J) in the pregenital segment and across the preceding abdominal and metathoracic segments. Quinquelocular disc pores (K) in a single band from the anterior spiracle, but in a divided band from the posterior spiracle, each band narrowing towards the margin, where the pores also become more frequent. Ventral tubular ducts of two types: immediately posterior to the genital opening is a small group of ducts (Lii) similar to those elsewhere, except that the outer ductule is rather broader, and the inner ductule thinner with a broadened base; elsewhere the ducts (Li) are similar to the dorsal ducts, but a little smaller, and are most frequent medially. Found throughout the ventral surface, but most frequent laterally are minute simple pores (M). Forming a fairly broad marginal band for about half the length of the stigmatic pore bands are the larger dorsal 8-shaped pores (A); lying within this band is a very narrow band of ventral 8-shaped pores (P), only about 2 pores wide. Lying between this band and the position of the spiracles is a further band of pores, the minute ventral square-shaped pores (N), which appear to be absent more medially. Ventral setae as follows: large setae restricted to the last two pregenital segments medially; medium sized setae in pairs in the median areas of the more anterior abdominal segments, and with two pairs between the antennae; small setae found occasionally laterally, in small groups just medially to the legs, and in the last two pregenital segments. Spiracles normal, with the opening of the anterior spiracle 24–28 μ wide. Legs relatively small, with no articular scleritis between the tibia and tarsus, with a distinct minute denticle on the claw, and with fine digitules; dimensions (iii): trochanter plus femur 33–39 μ , tibia plus tarsus 49–65 μ . Antennae of nine segments, all slightly annular in shape; length 170–186 μ . Labium one-segmented, with four pairs of terminal setae, length 68–73 μ . Anal ring well sclerotized, with two rows of small pores, and with ten anal setae. Anterior margin of the anal cleft between the anal plates sclerotized, with two pairs of setae, the outer pair widely spaced. Posterior lobes with a pair of long setae (29–42 μ), and a single pair of short stout setae.

Holotype ♀, SOUTH AFRICA: Cape Province, Tradouw Pass, on the smaller stems and twigs of *Erica* sp. (Ericaceae), 11.i.1969 (J. Munting), NCI, H.C.No. 3437.

Paratypes, SOUTH AFRICA: Cape Province, Tradouw Pass, on the smaller stems and twigs of *Erica* sp., 11.i.1969 (J. Munting), 4 ♀ on 4 slides NCI, and 1 ♀, BMNH.

SOUTH AFRICA: Cape Province, Mitchell's Pass, ex *Erica* sp., 22.ii.1966 (J. Munting), NCI; Cape Province, Tradouw Pass, ex *Erica versicolor*, 11.i.1969 (J. Munting), 1 ♀, NCI.

The material from Mitchell's Pass was identical to that from Tradouw Pass, except that the tibia plus tarsus was 69–72 μ . This species belongs to the *L. brabei*–*L. tarsalis* group whose main characters are given under *L. brabei*. *L. erica* is also closest to *L. brabei* and differs from it in the following characters: (i) mature

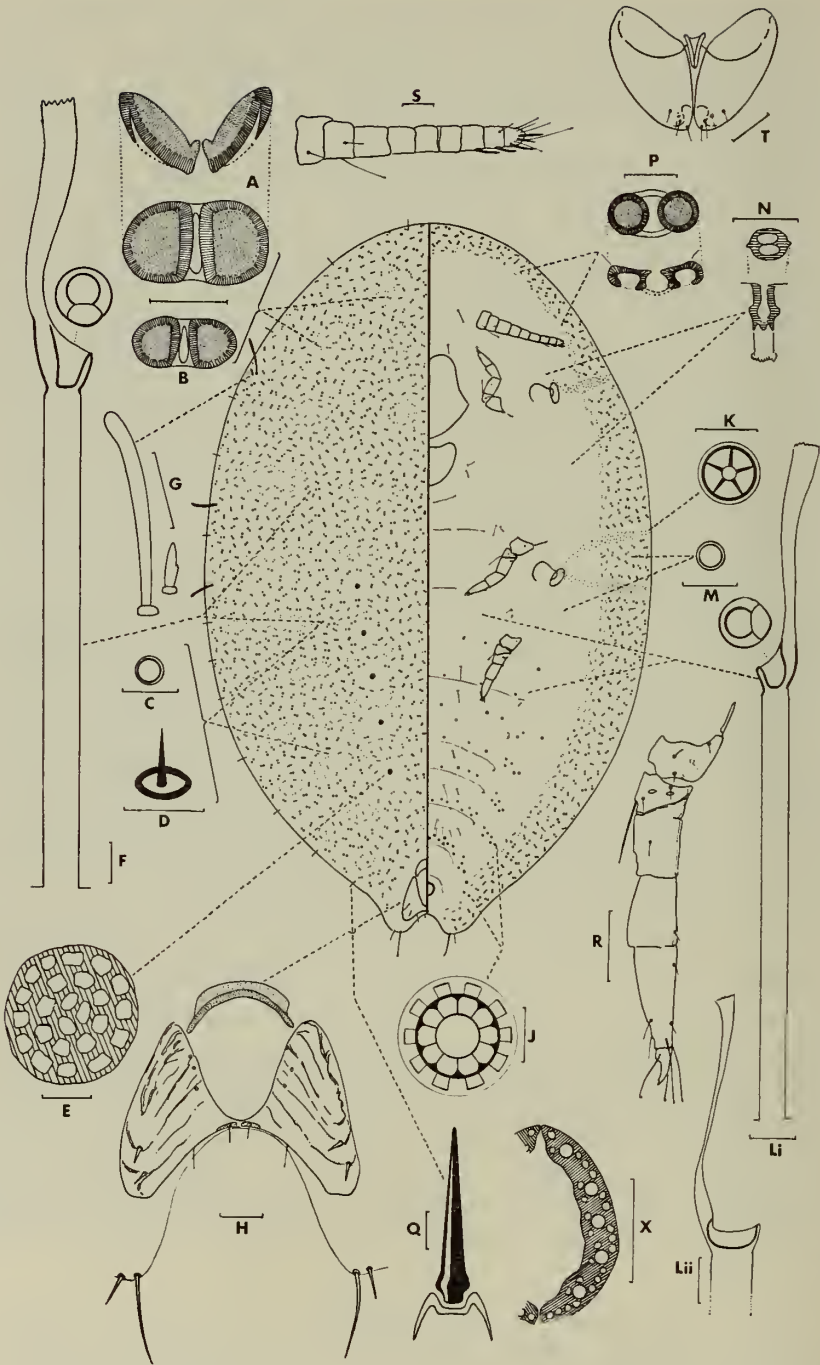


FIG. 6. *Lecanodiaspis erica* sp. n.

adult females are less than half the size; (ii) the limbs are over a third smaller, whilst the anal plates and labium are only slightly smaller; (iii) the cribriform plates tend to be larger and have more pores; (iv) the anal plates are more heavily ridged; (v) there are fewer multilocular disc pores in *L. erica*, and there is no small group of pores on either side of the genital opening, as in *L. brabei*; (vi) there are fewer setae on the posterior lobes, and (vii) the denticle on the claw is distinct, whilst in *L. brabei* it is particularly indistinct. Whilst many of these differences appear small, taken together they seem to the author quite sufficient to separate these two species.

The 1st instar nymphs of *L. brabei* have been described by Williams & Kosztarab (1970 : 33). Although the adult females of *L. erica* and *L. brabei* are rather similar, the 1st instar nymphs are very different, with four rows of 8-shaped pores dorsally in the abdomen in *brabei* and only three in *L. erica*.

Lecanodiaspis erratica De Lotto, 1955

(Text-fig. 7)

Lecanodiaspis erratica De Lotto, 1955 : 269. Holotype ♀, KENYA, on *Coffea arabica* (BMNH) [examined].

'Test of the adult female circular, moderately convex with a small operculum at the anal end; colour light brown, at times darker on the median area. Diameter 2-2.5 mm.' (De Lotto, loc. cit.)

Mounted material almost circular, 1.2-1.8 mm long. Dorsal surface membranous, with numerous tubular ducts (F), which have the outer ductule with internal ridges; rather sparse 8-shaped pores (B); minute simple pores (C), and very infrequent minute setae (D). Marginally, the 8-shaped pores are larger (A). Cribriform plates relatively large, generally rather oval in shape, with numerous pores, and found medially about the 2nd and 3rd abdominal segments, either as two closely adjacent lines of four plates, or as a compact group of plates. Anal plates (H) not heavily sclerotized, 42-52 μ long, and with almost no ridges—a few present along the posterior edges; each plate has three latero-terminal stout spines, and also two finer setae towards the centre; small pores appear to be absent; dorsal plate almost square, with a heavily sclerotized posterior edge. Body margin hard to define, completely lacking in stigmatic spines, but with about 14 fairly long fine setae along each side.

Ventral surface membranous, with multilocular (10) disc pores (J) around the genital opening, and in all the preceding abdominal segments. Quinquelocular disc pores (K) present only as a small group near the spiracles, 7-10 near the anterior and 5-6 near the posterior spiracle; there is a slight tendency for them to become multilocular. Forming a marginal ring are the larger 8-shaped pores (A), whilst immediately within this is a very narrow band of slightly smaller ventral 8-shaped pores (P). Inside this is a band of square-shaped pores (N); these occur to about half way to the spiracles. Minute simple pores (M) are found throughout the ventral surface, but are most common laterally. The ventral tubular ducts are of two types: immediately posterior to the genital opening is a small group of pores (Lii) similar to those elsewhere, except that the outer ductule is a little broader and the inner ductule a little thinner, but broadened at the base; elsewhere the ducts (Li) are similar to the dorsal ducts, but a little smaller. Spiracles normal, width of the anterior opening 26-28 μ . Ventral setae apparently reduced, with a single pair between the antennae, and a pair in the last two pregenital segments; a few minute setae occur scattered throughout the ventral surface, and also form a submarginal ring. The legs (R) are reduced or absent, rarely composed of more than one segment with a

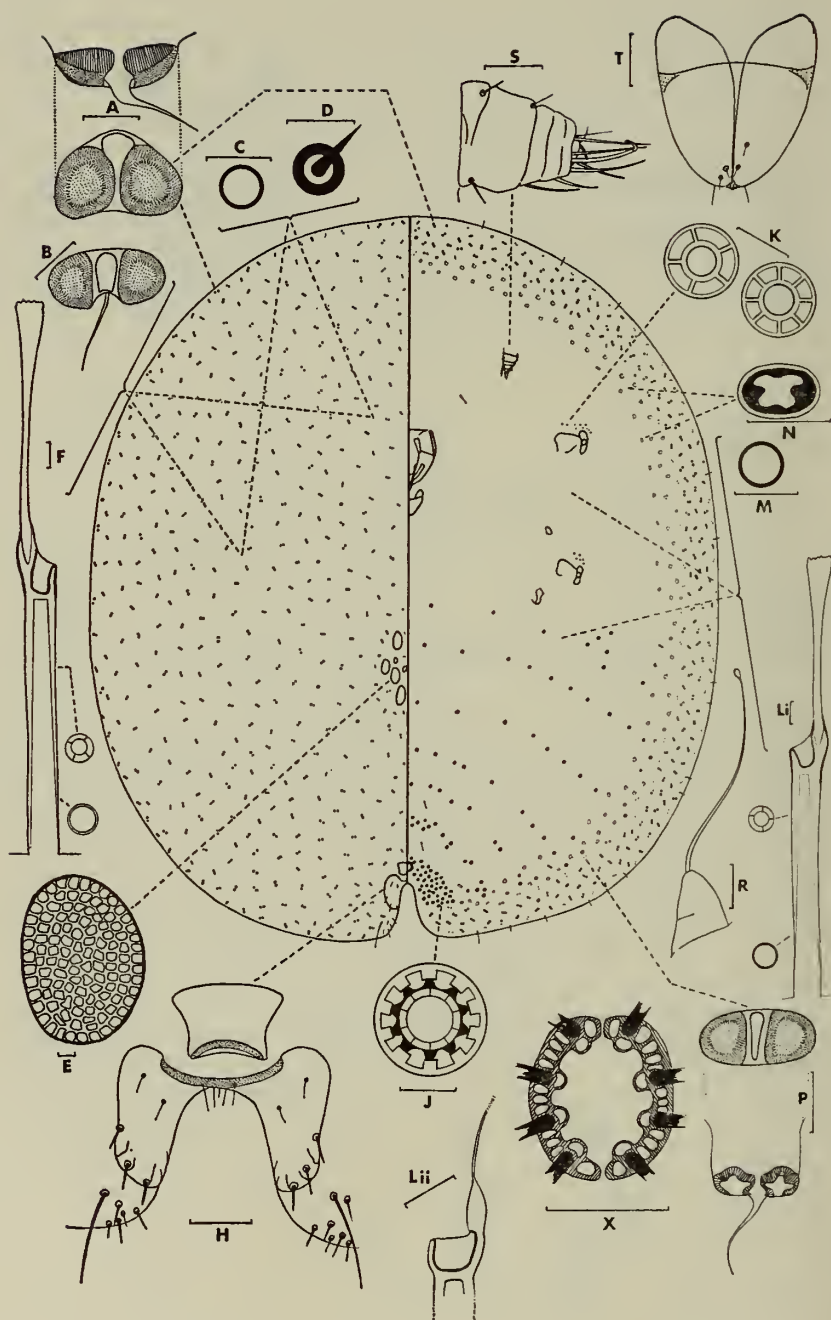


FIG. 7. *Lecanodiaspis erratica* De Lotto.

few small setae, and perhaps a terminal digitule. Antennae (S) also reduced, of 3-5 ring-like segments, the terminal three having stout sensory setae and a few fairly short fine setae; length 36-49 μ . Labium (T) one-segmented, with three pairs of small terminal setae; length 77-78 μ . Anal ring well sclerotized, with one complete and one very incomplete row of small pores, and eight anal setae, evenly spaced around the ring. Anterior margin of the anal cleft with a heavily sclerotized ridge joining the lateral anal plates, and a single pair of setae (though there is a small group of 3-4 between the anterior margin and the genital opening). Posterior lobes with a single long seta (28-34 μ), and with a small group of 5-7 short setae.

Redescribed from the following material labelled *Lecanodiaspis erratica* De Lotto:

Holotype ♀, KENYA: Kiambi, ex *Coffea arabica* (Rubiaceae), 17.vii.1942 (De Lotto), BMNH 1963 : 212.

Paratypes: As above for holotype, 11 ♀ on 11 slides, BMNH 1963 : 212.

Also seen, but not used in the above redescription:

KENYA: Ruiru, ex Coffee, May 1931 (*T. L. McClelland*), BMNH; Kiambu, ex Coffee, 9.xii.1929 (*T. J. Anderson*), BMNH.

This species and *L. natalensis* appear to be fairly closely related; they share the following characters: (i) eight setae in the anal ring; (ii) tubular ducts with internal ridges; (iii) limbs very much reduced or absent; (iv) antennae reduced to a few annular segments; (v) stigmatic spines entirely absent; (vi) quinquelocular pore bands reduced to a small group immediately adjacent to the spiracles, and (vii) dorsal 8-shaped pores of two sizes, the larger restricted to the margin. They differ in the form of their anal plates, with three sub-apical setae, and two smaller ones around the middle of each lateral plate in *erratica*, whilst they are restricted to two stout sub-apical setae in *natalensis*; and in the position and presence of cribriform plates, which appear to be generally absent in *natalensis*, but when present are probably as two diverging lines rather than the medial group in *erratica*. The adult females also differ in shape, *erratica* being practically circular, whilst *natalensis* is distinctly elongate ovate. See under *L. mimosae* for further comments.

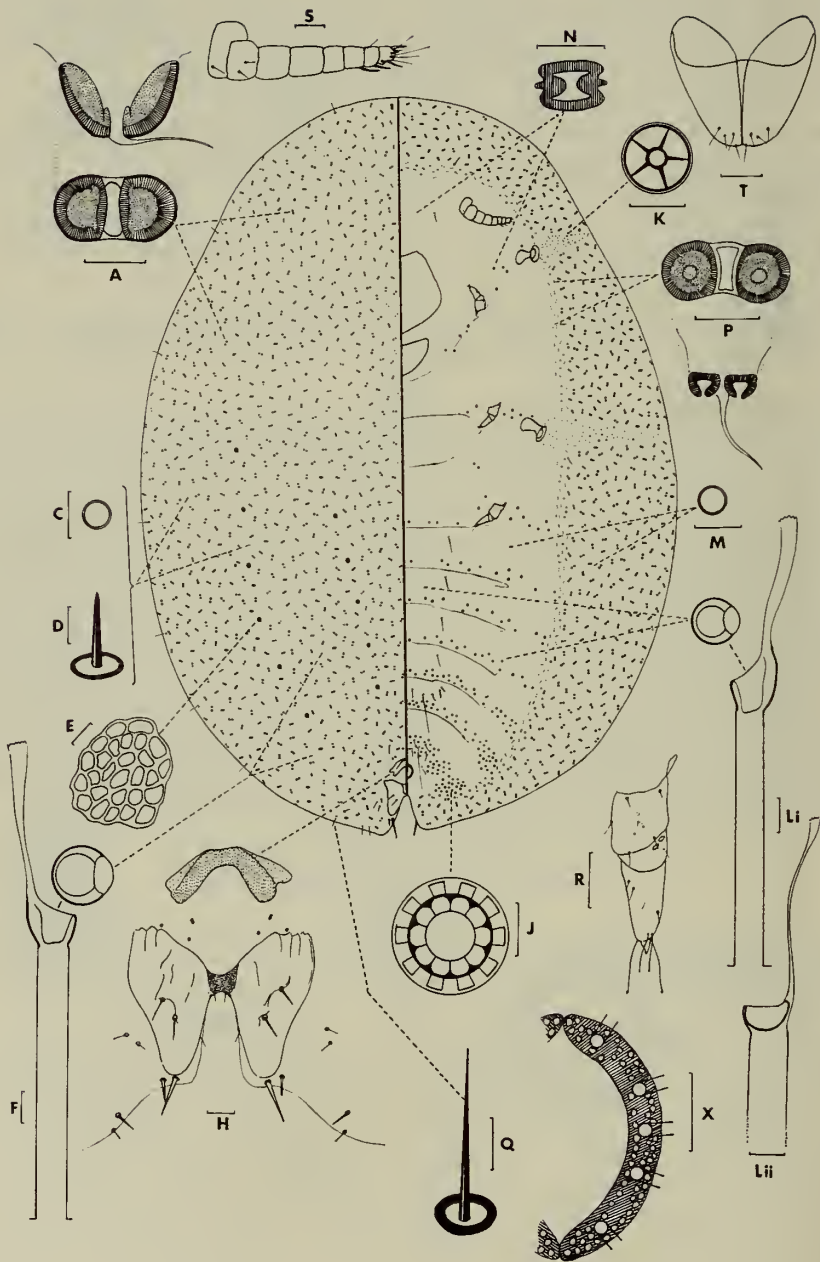
Lecanodiaspis magna Brain, 1920

(Text-fig. 8)

Lecanodiaspis magna Brain, 1920 : 117. LECTOTYPE ♀, SOUTH AFRICA, on 'native shrub' (NCI), here designated [examined].

'Adult females congregate on the crown of the host plant at just about ground level.' 'Test of the adult ♀ about 6 mm long, 4.5 mm wide and 3 mm high, regularly oval, or slightly narrowed in front and with the hind margin very slightly flattened, with a faint median indentation. The dorsum is very convex, ventral surface slightly rounded. The test is entire and homogeneous in texture, smooth or very faintly roughened, without ridges, but occasionally with very faint ribbed corrugations at the sides. The colour is of a uniform biscuit tint.' (Brain, loc. cit.)

Dorsal surface membranous, and covered with (i) 8-shaped pores (A) (those nearest the margin perhaps being a little larger than those medially), (ii) minute simple pores (C), (iii) tubular ducts (F), and (iv) rather infrequent minute dorsal setae (D). Cribriform plates (E) present in four rows diverging from the anal area over the more anterior abdominal and thoracic segments; with 3-6 plates per row, each plate with 10-20 pores. Anal plates (H) with rather few ridges, no small pores (though with a few between the lateral plates and the dorsal plate), but two stout

FIG. 8. *Lecanodiaspis magna* Brain.

setae in the middle of each plate; length 110–127 μ ; dorsal plate well sclerotized, and rounded laterally. Stigmatic spines entirely absent. Marginal setae (Q) setose, 10 μ long, with about 10 per side, tending to be more spinose posteriorly.

Ventral surface membranous, with multilocular (J) disc pores (J) around the genital opening, and in all the preceding abdominal and thoracic segments, though rather sparse anteriorly, where they are restricted to near the coxae and spiracles. Quinquelocular disc pores (K) in single broad bands between the spiracles and the margin, broadest near the spiracles. Ventral tubular ducts of two sorts: immediately behind the genital opening is a small group of ducts (Lii) similar to those elsewhere, except that the outer ductule is a little broader and the inner ductule a little thinner, but not broadened at the base; elsewhere the ducts (Li) are similar to the dorsal ducts, though a little smaller, and are most frequent medially. Minute simple pores (M) also throughout, but most frequent near the margin. Dorsal 8-shaped pores (A) forming a rather wide band almost reaching the spiracles; within this band is a band of ventral 8-shaped pores (P) about 2 pores wide; further in is a rather broad band of square shaped pores (N) which are found medially to an imaginary line formed by the coxae, antennae and anal plates, with an occasional one medially. Spiracles normal, with the anterior opening 50–58 μ wide. Ventral setae: very long setae found as a pair in the last two pregenital segments; single pairs of medium length setae found medially in all other abdominal segments, and between the antennae; small to minute setae found in groups in the last two pregenital segments, and occasionally submarginally. Legs (R) very much reduced, apparently composed of a coxa, trochanter, and one further segment, with a claw; claw without a denticle; normal fine digitules; dimensions (iii): entire leg 75–90 μ . Antennae (S) of 8–9 segments (eight figured by Brain, though he says nine in the text), all rather annular; length 168–204 μ ; terminal fine setae all rather short. Labium (T) one-segmented, with four pairs of small terminal setae, length 82–87 μ . Anal ring (X) heavily sclerotized, with two to three rows of small pores, and ten anal setae. Anal cleft (H) shallow, with a single pair of fine setae anteriorly, where there is a broad area of dense sclerotization joining the two lateral anal plates; there is a further pair of setae along the margins of the cleft. Posterior lobes with a single long seta (23–36 μ long) and a shorter pair (the longer pair were considered to be part of the anal plates by Brain).

Redescribed from the following material labelled *Lecanodiaspis magna* Brain:

Lectotype ♀, SOUTH AFRICA: Cape Province, Groot Drakenstein, on the crown of a native shrub, June 1916 (C. W. Mally), C.K.B.27, NCI.

Paralectotypes: 5 ♀ on 3 slides, with same data as lectotype, 1 ♀ NCI, rest USNM.

Also used in the above redescription were 3 ♀ on 3 slides made from dried material, labelled as above, 2 ♀ BMNH, 1 ♀ NCI.

L. magna is very close to *L. zygophylli* (described below) and *L. africana*; see under these species for comparison.

Lecanodiaspis mimosae (Maskell, 1897)

(Text-fig. 9)

Prosopophora prosopidis var. *mimosae* Maskell, 1897 : 316. Holotype ♀, 1896, W.M.M. (no other data) (Department of Scientific and Industrial Research, Nelson, New Zealand).

Lecanodiaspis mimosae (Maskell) Cockerell, 1899 : 394.

Lecanodiaspis mimosae (Maskell); Brain, 1920 : 116.

Lecanodiaspis mimosae (Maskell); Morrison & Morrison, 1927 : 30.

Lecanodiaspis mimosae (Maskell); Hall, 1935 : 219.

Lecanodiaspis mimosae (Maskell); Williams & Kosztarab, 1970 : 59.

‘Test of adult ♀ about 4.5 mm long, 3.5 mm broad and 1.7 mm thick, with the dorsum almost flat, the upper and lower surfaces almost parallel, with the margins rounded. When not

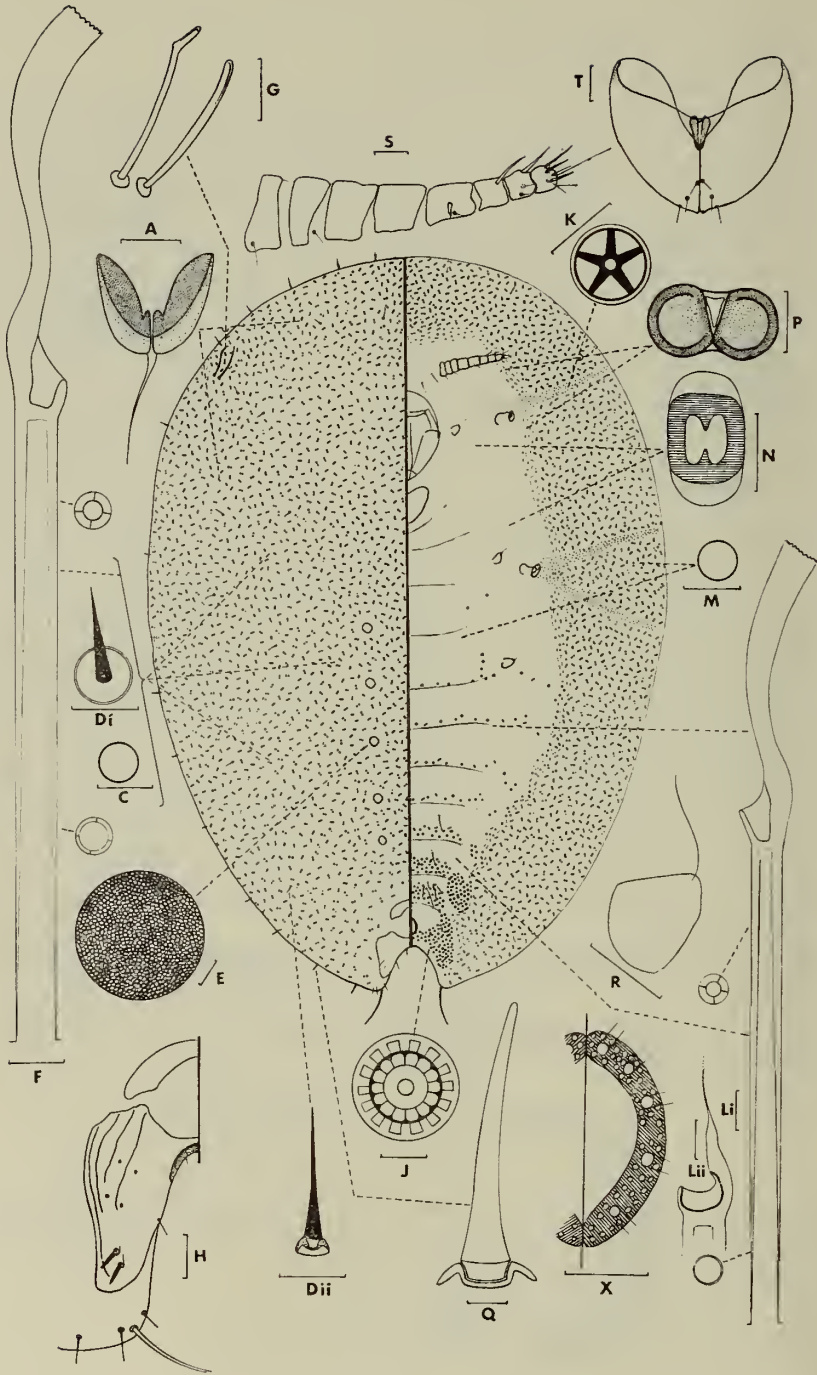


FIG. 9. *Lecanodiaspis mimosae* (Maskell).

crowded together the specimens are glued flat to the bark, button-like, but when a number are massed together they are often distorted. The colour of the young is creamy, but later becomes suffused with brown, with a more distinct median line. The dorsal surface is flaky, without keel or transverse ridges.' ♂ puparium 1.8 mm long, 1 mm broad, elongate oval, rather more pointed in front, flat, with a median keel and faint transverse ridges, pale brown, with a distinct semi-circular operculum.' (Brain, loc. cit.)

Mounted material oval to circular, 1.3–4.0 mm long. Dorsal surface membranous, with 8-shaped pores (A) distributed quite densely throughout the dorsal surface in no particular pattern, but those nearer the margin being slightly larger. Also throughout the dorsal surface are minute simple pores (C) and rather long tubular ducts, which have internal ridges in the outer ductule (F). The dorsal setae of two sizes, a minute seta (Di) (4 μ long) is found most commonly near the middle, whilst more laterally are larger setae (Dii) (7–12 μ long); both setae are rather sparse. Cribriiform plates (E) in two slightly diverging lines of five quite large plates, each with many pores; they lie entirely within the abdomen. Anal plates (H) well developed, but with relatively few ridges, with two to four small pores towards the centre, and two pairs of spinose setae near the posterior end; length 87–102 μ ; dorsal plate with slight indications of a bifid end. Marginal setae (Q) sharply spinose, with 14–15 per side with small basal discs, but distinctly smaller anteriorly; 12–22 μ long. Stigmatic spines (G) restricted to the anterior stigmatic areas, with two spines of approximately the same length, both with slightly spatulate ends; length 29–59 μ .

Ventral surface membranous, with multilocular (10–12) disc pores (J) found quite densely around the genital opening, and in all the preceding abdominal segments, and also in the last two thoracic segments, becoming much scarcer anteriorly. Quinquelocular disc pores (K) in the normal single anterior band and divided posterior band, the bands several pores wide, and broadest nearest the spiracles. A broad band of the larger dorsal 8-shaped pores is found marginally almost as far as the spiracles, and are quite densely placed. Within this zone is a band of ventral 8-shaped pores (P), 2–3 pores wide. Between them and an area roughly indicated by the legs and antennae is a band of square-shaped pores (N). Within this area are found minute simple pores (M), which are much more scarce medially, and ventral tubular ducts of two types: immediately posterior to the genital opening is a small group of ducts (Lii) similar to those elsewhere, except that the outer ductule is a little broader, and the inner ductule a little thinner with a broadened base; elsewhere the ducts (Li) are similar to the dorsal ducts, but slightly smaller. Ventral setae very much reduced, with two pairs between the antennae, and a pair in each of the three pregenital segments; there is also a sparse submarginal ring. Spiracles normal, width of the anterior opening 37–53 μ wide. Labium (T) one segmented, with three pairs of small setae terminally; length 87–95 μ . Antennae (S) of eight rather annular segments, occasionally seven or nine, depending on the pseudo-articulation in the fifth or sixth segments; length 190–238 μ ; most of the apical fine setae rather short. Legs (R) reduced to small stumps or absent, with apparently a single long seta. Anal ring (X) with three rows of small pores, and ten setae. Anterior margin of the anal cleft joining the lateral anal plates heavily sclerotized, with a pair of small setae anteriorly, and another pair widely spaced laterally. Posterior lobes (H) with a single pair of long setae (52–69 μ), and two to three pairs of short setae.

Redescribed from the following material labelled *Lecanodiaspis mimosae* (Maskell):

SOUTH AFRICA: Cape Town, ex *Mimosa* (*Acacia* sp.), 14.vi.1896 (C. P. Lounsbury), ♀, USNM; Transvaal, Vanderbijl Park, ex *Acacia karroo* (Leguminosae), 12.iv.1962 (J. Munting), 2♀, NCI; Cape Province, Addo, ex *Acacia* sp., Dec. 1969 (J. F. de Villiers), 4 ♀, NCI; Cape Province, Fort Beaufort, ex *Acacia horrida*, Sept. 1900 (C. P. Lounsbury), 2♀, USNM. SOUTH WEST AFRICA: Windhoek, on *Acacia giraffae*, Jan 1900 (J. C. Watermeyer), NCI; no locality, ex *Mimosa* (*Acacia*) *giraffae*, Lounsbury coll., no date, 2 ♀, USNM.

It is possible that the 1896 material is that from which Morrison and Morrison redescribed this species in 1927. It lacks the serial number (533), and the USNM

catalogue number 40372 however, but this material seems to be otherwise absent from US collection.

This species shares certain characters with *L. erratica*, *L. natalensis* and *L. brachystegiae*. They are as follows: (i) tubular ducts with internal ridges; (ii) limbs very much reduced or absent; (iii) dorsal 8-shaped pores of two sizes, the larger forming the marginal ring (in *mimosae* the lateral pores are barely larger than those elsewhere). *L. mimosae* differs from *L. erratica* and *L. natalensis* in (i) having ten setae in the anal ring; (ii) having a fairly normal antenna; (iii) having stigmatic spines, although these are reduced to the anterior cleft; and (iv) in having fully developed quinquelocular pore bands. The arrangement of the cribriform plates and the form of the anal plates also differ. The main differences from *L. brachystegiae* are given on p. 424.

Lecanodiaspis natalensis Brain, 1920

(Text-fig. 10)

Lecanodiaspis natalensis Brain, 1920 : 116. LECTOTYPE ♀, SOUTH AFRICA, on *Hibiscus* sp. (NCI), here designated [examined].

'Test of adult ♀ about 2.5 mm long and 1.6 mm broad at the widest part, which is about the middle, flat, somewhat elliptical with the two ends narrowed. In some cases the anterior end is broadly rounded and the posterior extremity pointed. The dorsum is flat and covered with a layer of white material, which is distinctly divided into three series of \pm rectangular plates, the appearance of which suggested *Orthezia*. The median series is not quite as broad as the two lateral ones and consists of nine patches, the number which is apparently constant for each of the two lateral series also.' (Brain, loc. cit.)

Mounted material 1.3–2.1 mm long, generally rather pointed at the posterior end, and occasionally at the anterior end also. Dorsal surface membranous, covered in 8-shaped pores (B), which appear to have no particular pattern, but are distinctly larger marginally (A). Found throughout the dorsal surface are minute simple pores (C), tubular ducts (F), the outer ductule of which is internally ridged, and, much less frequently, minute dorsal setae (D). Cribriform plates (E) either absent or exceedingly few (in the available six specimens there were two single plates); they were round and had numerous pores. Anal plates (H) normal, though tending to lie vertically on the slide, thus making the structure difficult to see; length 45–54 μ , when seen flat the ridges are not very pronounced, but appear to be very definite when seen laterally; with two stout setae near the posterior end; dorsal plate as usual, widest laterally. Stigmatic spines entirely absent. Marginal setae rather few.

Ventral surface membranous, with multilocular (10–12) disc pores (J) around the genital opening and in all the preceding abdominal and thoracic segments, and with a single pair lateral to the labium in the head; they get progressively scarcer anteriorly. Quinquelocular disc pores (K) reduced to small groups of 5–8 pores in the immediate vicinity of the spiracles. Marginally, the larger 8-shaped pores form a band of moderate width, inside which is a band 2–3 pores wide of ventral 8-shaped pores (P), whilst between this band and the spiracles is a fairly broad band of square-shaped pores (N). Throughout the ventral surface are minute simple pores (M), though these are rather scarcer medially; also ventral tubular ducts of two types: immediately posterior to the genital opening is a small group of ducts (Lii) similar to those elsewhere, except that the outer ductule is a little broader and the inner ductule a little thinner with a broadened base; elsewhere the ducts (Li) are similar to the dorsal ducts, but slightly smaller. Ventral setae scarce, with a single pair of short setae between the antennae, and medially in each of the abdominal segments, and also forming a submarginal band; there are also several groups of small setae medially in the two pregenital segments. Spiracles normal; width of the anterior opening 28–29 μ . Labium (T) one-segmented, with three pairs of small terminal setae; length

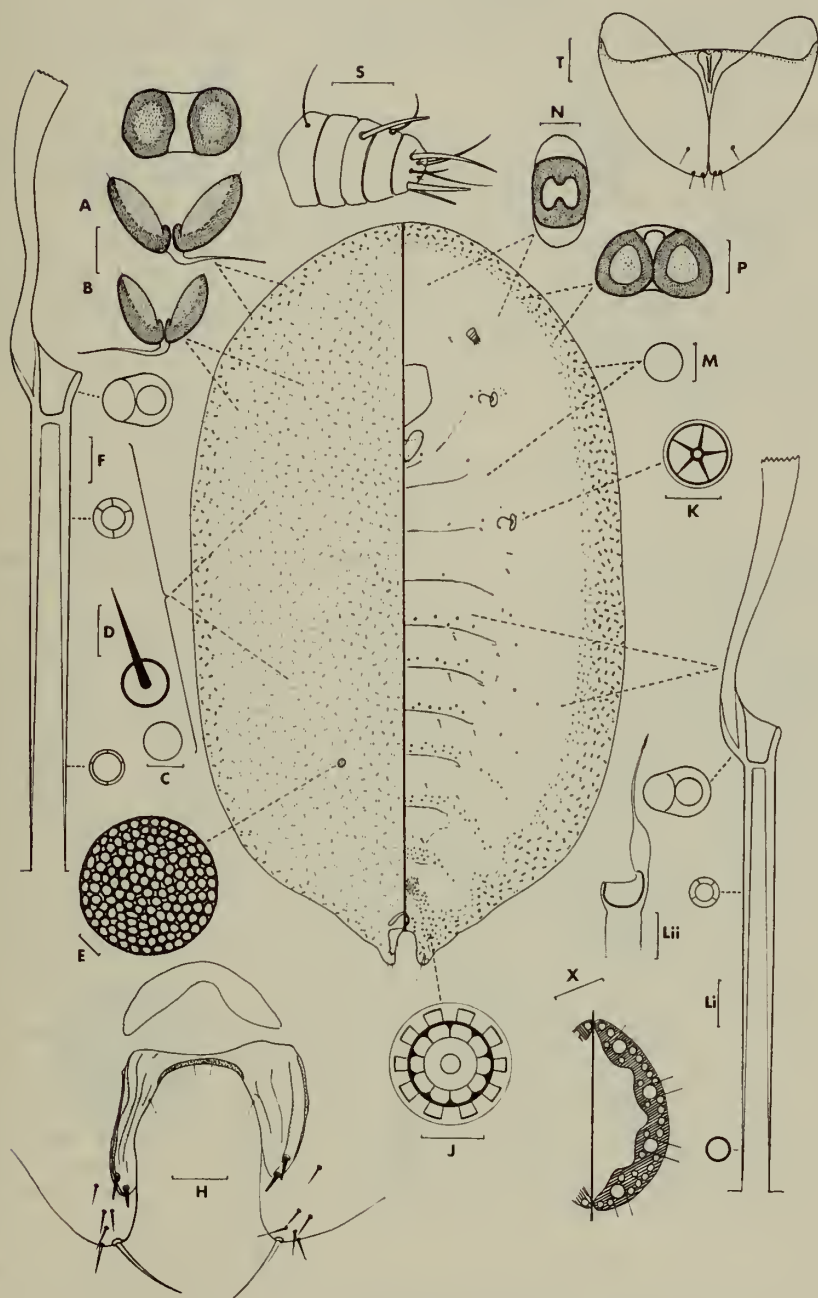


FIG. 10. *Lecanodiaspis natalensis* Brain.

81–85 μ . Legs entirely absent. Antennae (S) much reduced to five ring-like segments, with all the fine setae short; length 40–50 μ . Anal ring (X) with eight anal setae; rather narrow, with one complete ring and one incomplete ring of small pores. Anal cleft (H) with a broad area of dense sclerotization anteriorly with a single pair of setae, and with another pair laterally; there are generally 2–4 between the cleft and the genital opening. Posterior lobes (H) with a single pair of long setae (40–50 μ), and 4–6 pairs of short setae.

Redescribed from the following material labelled *Lecanodiaspis natalensis* Brain:

Lectotype ♀, SOUTH AFRICA: Durban, on *Hibiscus* sp. (Malvaceae), 20.vii.1916 (*C. P. van de Merwe*), CKB 301, NCI.

Paralectotypes: 4 ♀ on 4 slides with same data as lectotype; 3 in USNM and 1 in NCI.

Also used in the description was a single specimen mounted from dried material labelled as above, deposited in BMNH.

See under *L. erratica* and *L. mimosae* for comments.

Lecanodiaspis parinarii Hall, 1935

(Text-fig. 11)

Lecanodiaspis parinarii Hall, 1935 : 219. LECTOTYPE ♀, RHODESIA, on *Parinarium curatellifolia* (BMNH), here designated [examined].

'Test of the adult female broadly ovate and flat convex. The shape is very variable being much influenced by the very rough and uneven nature of the bark of the host plant. Colour usually drab, but individuals have been seen in which it is almost ochreous. The surface of the test is somewhat rough owing to several slightly raised and flattened protuberances; these are obscure, except with the aid of the binocular microscope, and exhibit no definite arrangement . . . Length of the test of the adult female 3.0–3.5 mm; breadth 2.5–3.0 mm . . . Young individuals very flat, shiny brown, covered with a fine film of white translucent matter. A distinct median longitudinal carina is present and several less distinct carinae running from thence to the margin. In dead specimens the margin is usually slightly upturned.' (Hall, loc. cit.)

Mounted material oval to almost circular, membranous, 1.0–2.1 mm long. Dorsal surface with numerous 8-shaped pores of two sizes, the larger (A) forming a reticulate pattern, and a marginal band, with the smaller pores being found throughout the rest of the dorsal surface. Also throughout are minute simple pores (C), and tubular ducts (F) with an internally ridged outer ductule. The dorsal setae vary considerably in size, being much smaller medially than near the margin, where they are about the size of the marginal spines; they all have enlarged basal discs. Cribriform plates (E) almost circular, quite large with numerous pores, in two almost parallel lines of 1–3 plates. Anal plates (H) normally developed, with longitudinal ridges moderately developed, with two stout spines postero-laterally, and with no small pores; length 65–75 μ ; dorsal plate fairly narrow, semicircular. Marginal setae (Q) very similar to the larger dorsal setae, with large basal discs, with about 14–16 on each side, and about 18 μ long. Stigmatic spines (G) present with two in the anterior group, and one each in the two posterior stigmatic areas; in the available material they appear to lack a spatulate end, and have a small terminal pore; length of the anterior spines 54–69 μ and 22–29 μ respectively; posterior spines 46–66 μ and 33–58 μ .

Ventral surface with multilocular (10) disc pores (J) absent from the genital segment, but abundant in each of the preceding abdominal segments, and in the metathorax; they are also found much less frequently in the other thoracic segments and near the antennae. Quinquelocular disc pores (K) in the normal single anterior and split posterior pore bands, the bands being

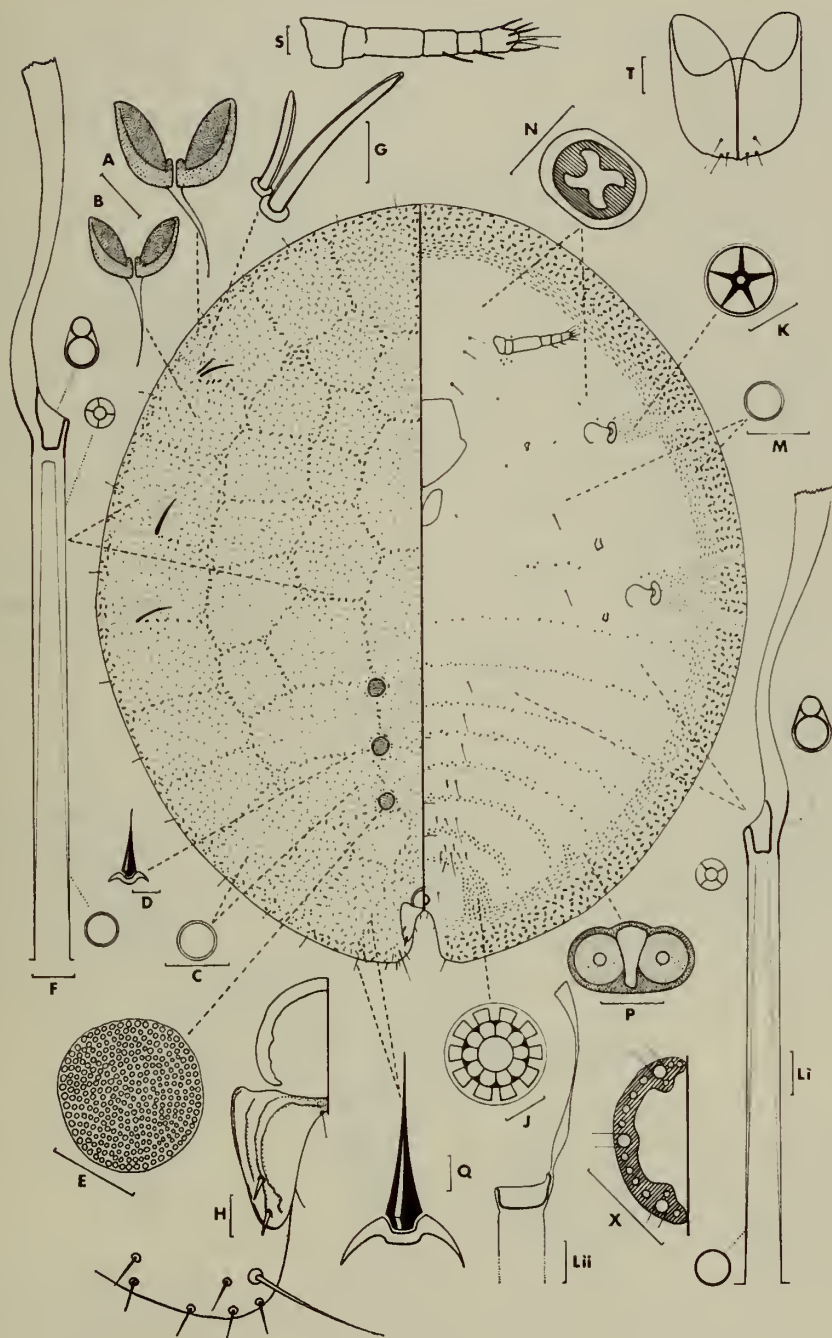


FIG. 11. *Lecanodiaspis parinarui* Hall.

broadest near the spiracles, becoming only about two pores wide near the margin. Ventral tubular ducts of two types: immediately posterior to the genital opening is a small group of ducts (Lii) similar to those elsewhere, except that the outer ductule is much broader, and the inner ductule thinner with a broadened base; elsewhere the ducts (Li) are similar to the dorsal ducts, though slightly smaller. Minute simple pores (M) most frequent marginally. The larger dorsal 8-shaped pores form a moderate marginal band, within which lies a band of ventral 8-shaped pores (P) about 4–6 pores wide. Between this band and a line formed by the spiracles, antennae and the anal plates, lies a fairly broad band of small square-shaped pores (N). Ventral setae rather sparse, but with three pairs between the antennae, a pair in the meso- and meta-thorax, and medially in each of the abdominal segments; with other smaller setae in the last three pregenital segments, and with a sparse sub-marginal ring. Spiracles normal, though perhaps relatively a little large: width of anterior opening 46–55 μ . Legs normally entirely absent, but may be represented by very small membranous outgrowths. Antennae (S) from 4–7 segmented, though most frequently five, depending on the pseudo-articulation of the second segment; with only two short fine setae on the terminal segment; length 150–185 μ . Labium (T) one-segmented, rather square, with three pairs of small terminal setae; length 85–95 μ . Anal ring with only six anal setae; with one complete and one very incomplete ring of small pores. Anal cleft with one pair of fine setae anteriorly, where the lateral plates are joined by an area of dense sclerotization; with a further pair of setae laterally; there is also a pair between the cleft and the genital opening. Terminal lobes (H) with a single pair of long setae (35–78 μ), and with two to five pairs of smaller setae.

Redescribed from the following material labelled *Lecanodiaspis parinarii* Hall:

Lectotype ♀, RHODESIA: Macheke, ex *Parinarium mobola* [now *P. curatellifolia*] (Rosaceae), 29.xi.27 (*W. J. Hall*, 137), BMNH. This slide has two specimens, one of which has been designated lectotype, the other paralectotype.

Paralectotypes. Three slides with 6 specimens, with same data as lectotype except that one slide is dated 23.iv.28, (*W. J. Hall*, 485), BMNH.

This species is immediately separable from all other species in Africa in having only six setae in the anal ring. It shares with the *L. brabei*–*L. tarsalis* group dorsal and marginal setae with enlarged basal discs, and the larger 8-shaped pores also being found marginally in the dorsum. It is however closer to the *L. erratica*–*L. mimosae* group with which it shares the following characters: i. tubular ducts with internal ridges; ii. legs very much reduced or absent; iii. cribriform plates with numerous pores; and iv. the ventral square-shaped pores being relatively larger than in the other group.

Lecanodiaspis tarsalis Newstead, 1917

(Text-fig. 12)

Lecanodiaspis tarsalis Newstead, 1917 : 16. LECTOTYPE ♀, SOUTH AFRICA, on 'native tree' (BMNH), here designated [examined].

Lecanodiaspis tarsalis Newstead; Brain, 1920 : 118.

Lecanodiaspis tarsalis Newstead; Hall, 1935 : 221.

Lecanodiaspis tarsalis Newstead; Williams & Kosztarab, 1970 : 85.

'Female test. Colour warm buff; narrowed slightly posteriorly; dorsum convex, with a median interrupted longitudinal ridge, and about twelve transverse ones on each side. Orifices terminal, circular; projecting from it in some individuals, is a short waxen filament. Texture dense; surface with exceedingly minute whitish particles. Length 2.2–1 mm; width 1.2–1.3 mm.' (Newstead, loc. cit.)

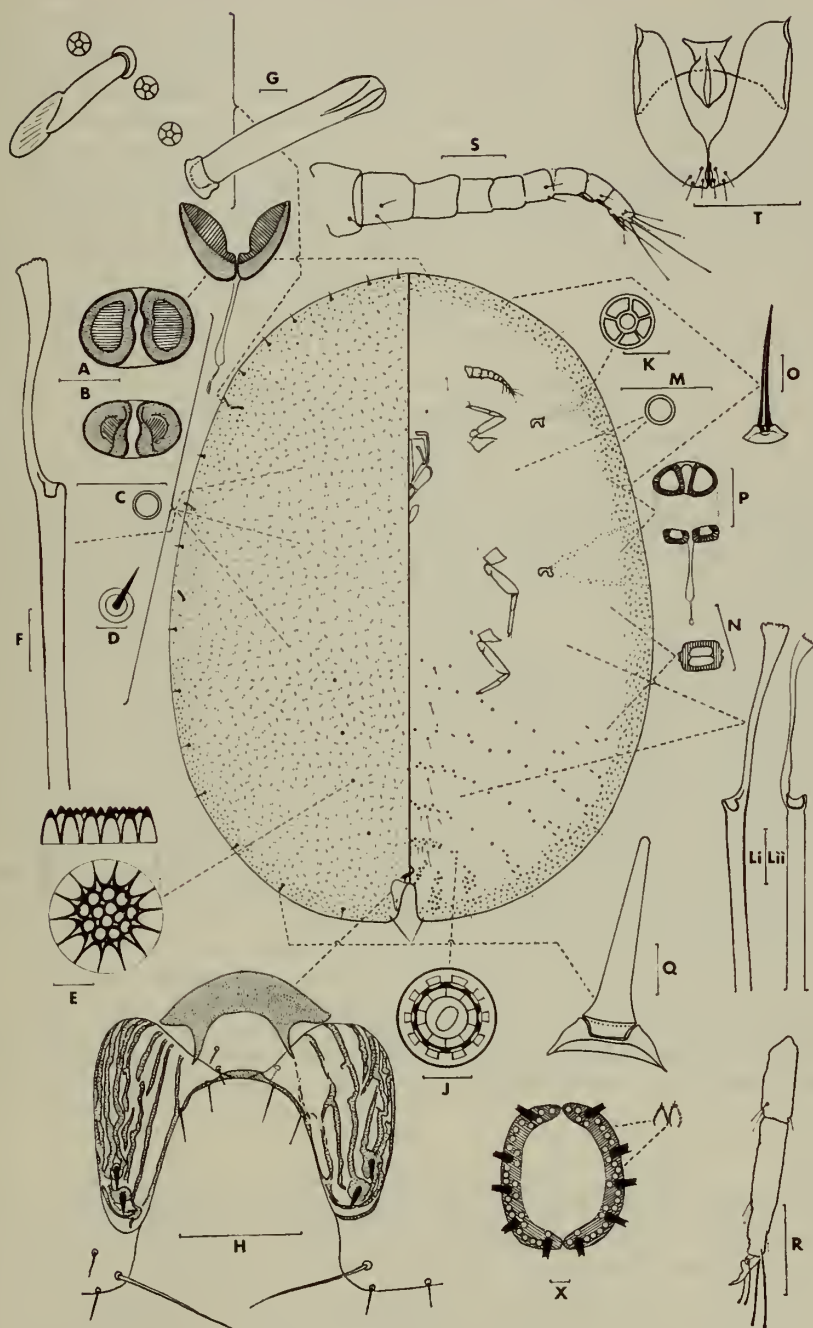


FIG. 12. *Lecanodiaspis tarsalis* Newstead.

Mounted material 1.5–3.0 mm long, and regularly oval in shape. Dorsal surface membranous, with 8-shaped pores of two sizes, the larger (A) apparently found segmentally, and the smaller (B) intersegmentally; the pores appear to be more frequent near the margin. Also throughout the dorsal surface are minute simple pores (C), tubular ducts (F) and, rather infrequently, minute setae (D). Cribriform plates in two almost parallel lines of 3–4 plates in the anterior abdominal segments; flat to concave, and with 10–25 small pores per plate. Anal plates (H) normal, with well developed longitudinal ridges, with no pores, but with two stout setae towards the posterior end; length 73–95 μ ; dorsal plate quite broad, with two wide extensions posteriorly. Stigmatic spines present, in three groups, all rather spatulate; anterior spines (G) 35–40 μ and 17–22 μ respectively, and the posterior spines 7–25 μ and 9–22 μ . Marginal spines (Q) large, bluntly pointed, with very large basal discs; 17–24 μ long, and with 15–17 per side.

Ventral surface membranous, with multilocular (10) disc pores (J) around the genital opening and in all the preceding abdominal segments; they are also present in a small group in the genital segment, but they appear to be absent from the thorax. Quinquelocular pores (K) in the normal single anterior and divided posterior bands, the anterior band a little broader than the posterior bands, and with the pores most frequent marginally. Throughout the ventral surface are minute simple pores (M), which are much more frequent marginally; and tubular ducts of two types: immediately posterior to the genital opening is a small group of ducts (Lii) similar to those elsewhere except that the inner ductule is much thinner, and the cup-end of the outer ductule is differently shaped; elsewhere the ducts (Li) are similar to the dorsal ducts but considerably smaller. The larger dorsal 8-shaped pores (A) form a rather narrow marginal band, within which is a very narrow band (1–2 pores wide) of ventral 8-shaped pores (P); whilst within this is a very sparse band of minute square-shaped pores (N) which are found to about 2/3rds of the way to the spiracles. Ventral setae: fairly large setae are found as two pairs between the antennae, single pairs associated with the coxae, and medially in each of the abdominal segments, and forming a submarginal ring; there are also groups of small setae in the genital and two pregenital segments. Spiracles normal, width of the anterior spiracular opening 25–29 μ . Antennae (S) normally of nine segments, the terminal segments usually with one to two rather fine, long setae; length 228–250 μ . Legs well developed, though a little small, with no tibio-tarsal articulatory sclerosis, with a small denticle on the claw, and with fine digitules; the tibia 1/2–1/3rd length of tarsus; dimensions (iii): trochanter plus femur 117–145 μ , tibia plus tarsus (R) 122–145 μ . Labium (T) one-segmented, with four pairs of small terminal setae; length 70–75 μ . Anal ring with one complete and one very incomplete row of small pores; with ten setae in the anal ring. Anal cleft with a distinctly sclerotized anterior margin between the lateral anal plates, and with two pairs of quite robust setae. Posterior lobes (H) with a single pair of long setae (55–72 μ), and with 2–5 pairs of small setae.

Redescribed from material labelled *Lecaniodiaspis tarsalis* Newstead:

Lectotype ♀, SOUTH AFRICA: Pretoria, on Native Tree, 1914 (*de Charmoy*), Dept. Agric. Mauritius, Newstead 13/322. BMNH Reg No. 1916.15. This slide contained three specimens, one of which has been designated lectotype, the other two paralectotypes.

Also seen:

SOUTH AFRICA: Transvaal, Pretoria ex *Hibiscus* sp. (Malvaceae), 4.x.65, (*J. Munting*), NCI; Transvaal, Vaalwater, ex *Dombeya rotundifolia* (Sterculiaceae), 2.ii.68 (*H. A. D. van Schalkwyk*), NCI; Transvaal, Loskop Dam, ex *Dombeya* sp., Jan. 1970 (*N. J. van Rensburg*). RHODESIA: Mazoe, ex *Hibiscus* sp., 19.x.27 (*W. J. Hall* (72)), MAS; Salisbury, Parkdown Nursery, ex *Hibiscus* sp., 21.x.64 (*M. E. Richardson*), MAS; Queensdale, on *Gardenia* sp. (Rubiaceae), 21.viii.67 (*J. Blowers*), MAS; Pomona, on the twigs of *Plumbago* sp. (Plumbaginaceae), 12.xi.62

(*van de Arend*), MAS; Gwelo, *Hibiscus* sp., 1.iv.64 (collector unknown), MAS; South Marandellas, ex *Dombeya rotundifolia*, 21.x.35 (W. J. Hall 811), BMNH.

This species would appear to be rather more widespread in Rhodesia now than when Hall was collecting, and is a minor pest of nursery stock.

L. tarsalis belongs in the same group as *L. brabei*, under which the group is discussed. It is distinguishable from the others in this group by (i) having the cribriform plates restricted to four pairs in the abdomen; (ii) in having multilocular disc pores in a small group in the genital segment (otherwise only found in *L. brabei*); (iii) in having 1–2 long fine setae terminally on the antennae; (iv) in the lengths of the legs which are longer than the antennae, and (v) in the dorsal anal plate, which has the two pronounced projections posteriorly.

Lecanodiaspis zygothylli sp. n.

(Text-fig. 13)

Unmounted material highly convex, with a shallow median longitudinal ridge, with shallow ridges running laterally from it, but with an unridged lateral area. Colour of the material stored in alcohol dark brown when old, but pale brown when young. Mature females with a covering of felt-like material. When mature, the adult female withdraws her abdomen, leaving a space at the posterior end of the cavity, which becomes filled with eggs and some cottony material.

Mounted material membranous, 1.6–3.6 mm long, elongate oval, but slightly constricted anteriorly in some specimens. Dorsal surface with two sizes of 8-shaped pores, the larger (A) forming a fairly wide marginal band and thin ridges across the abdominal segments, but covering the greater part of the thorax and head, where the exact distribution is difficult to discern; the smaller 8-shaped pores are found throughout the rest of the dorsal surface. Found frequently throughout are minute simple pores (C) and tubular ducts (F). Minute dorsal setae (D) very sparse. Cribriform plates (E) found in four more or less parallel lines diverging from the anal plates, with 3–6 plates in the outer rows, and 5–6 plates in the medial rows; each plate has numerous pores, though sometimes the more anterior plates become reduced in size. Anal plates (H) normal, with well developed ridges, 0–2 small pores, and with two stout spines towards the posterior end; length 151–163 μ ; dorsal plate rather flat and narrow. Stigmatic spines entirely absent. Marginal setae (Q) rather sparse with 6–12 on each side, stoutly spinose at each end, becoming finely spinose laterally.

Ventral surface with multilocular (10–12) disc pores (J) usually present in the genital segment and in each of the preceding abdominal segments, in the thorax, and with a single pore usually present near the antennae. Quinquelocular disc pores (K) in single bands between the spiracles and margin, broadest near the spiracles. The larger 8-shaped pores form a broad band marginally, within which is a narrow band (2–3 pores wide) of ventral 8-shaped pores (P). Between this band and the antennae, legs and anal plates is a band of minute square-shaped pores (N). Minute simple pores (M) occur throughout, though more frequently marginally. Ventral tubular ducts of two types: immediately posterior to the genital opening is a small group of ducts (Lii) similar to those found elsewhere except that the inner ductule is very fine, and the cup-shaped inner end of the outer ductule is of a different shape; elsewhere the ducts (Li) are similar to the dorsal ducts but a little smaller. Long ventral setae found in single pairs in each of the abdominal segments and between the antennae; short setae found as a sparse sub-marginal ring and in small groups in the last two pregenital segments; there is also a pair near the coxae. Spiracles perhaps a little large, width of the anterior opening 57–69 μ . Labium (T) one-segmented, slightly bowl shaped, with five pairs of small terminal setae; length 98–104 μ . Antennae (S) eight-segmented, 244–260 μ long, and with fine setae on the terminal segment all quite

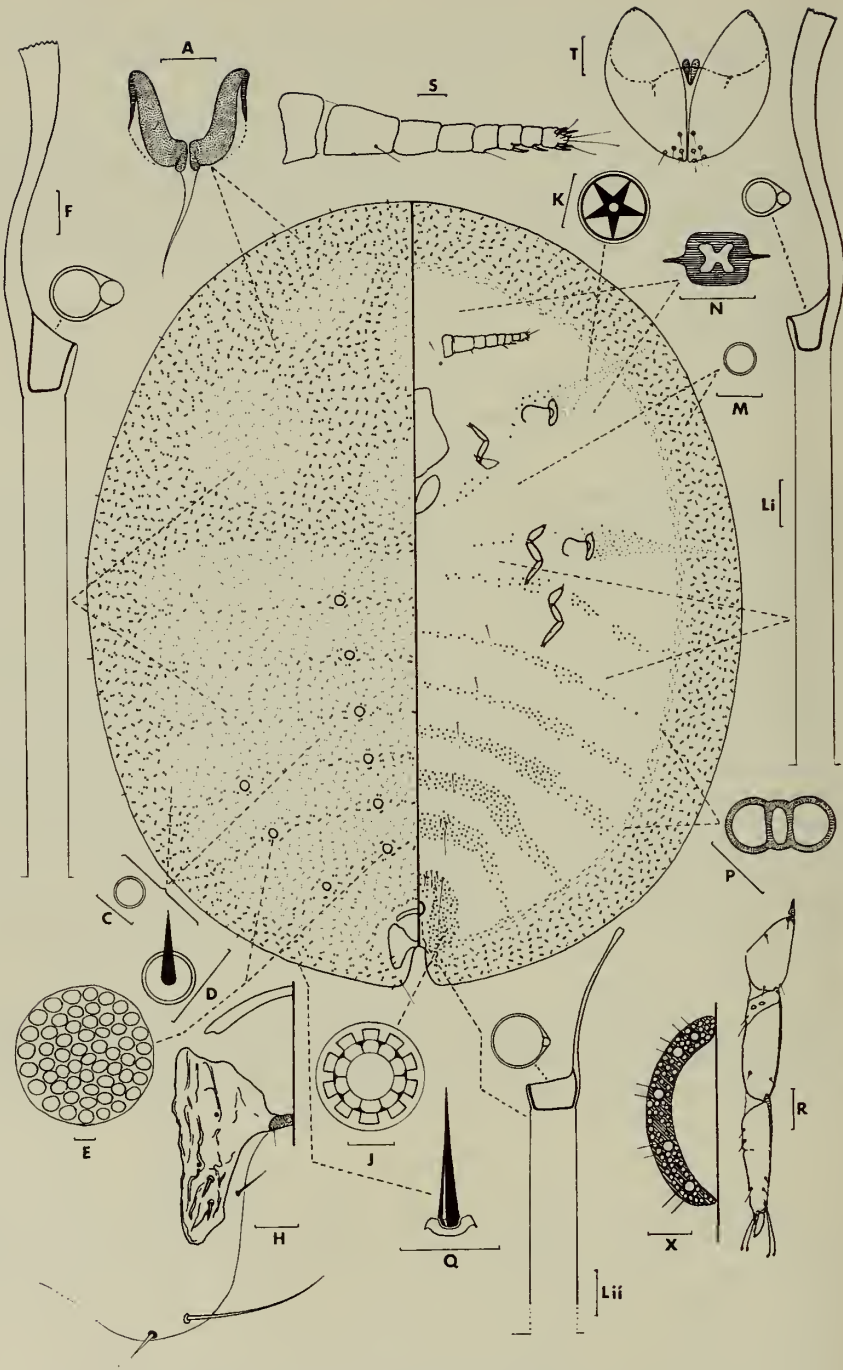


FIG. 13. *Lecanodiaspis zygophylli* sp. n.

short. Legs (R) relatively small, with the tibia and tarsus fused, though the degree of fusion varies slightly; with a distinct denticle on the claw and with fine digitules; dimensions (iii): trochanter plus femur 59–73 μ ; tibia plus tarsus 70–87 μ . Anal ring (X) with five pairs of anal setae, and with three almost complete rows of small pores. Anal cleft (H) with an area of sclerotization joining the two lateral anal plates, with one to two pairs of short setae, and with a further longer pair laterally. Terminal lobes (H) with a single pair of long setae (39–49 μ), and 1–2 pairs of short setae.

Holotype ♀, MAURITANIA: Coppolani, ex twigs of *Zygophyllum waterlotii* (Zygophyllaceae), 26.viii.1956 (*Ch. Rungs*), MNHN, No. 2701.

Paratypes, MAURITANIA: Coppolani, ex twigs of *Zygophyllum waterlotii*, 26.viii.1956 (*Ch. Rungs*), 30 ♀ on 30 slides deposited as follows: 12 slides and some specimens in alcohol in MNHN; 12 slides and some specimens in alcohol in BMNH; and two slides in each of the following: USNM, NCI and Department of Entomology, Virginia State University.

L. zygophylli is very close to *L. magna*, but differs (i) in having dorsal 8-shaped pores of two sizes, the larger being found medially as well as marginally; (ii) in having much larger cribriform plates; (iii) in that the two spines on each of the lateral anal plates are found terminally rather than medially; (iv) in that the femur is not fused with the tibia and tarsus, and (v) in having much more frequent multilocular disc pores. For further comments see under *L. magna*. It is also very similar to *L. africana*, but differs in possessing four rows of cribriform plates. The 1st instar nymphs also differ, in that those of *L. zygophylli* have three quinquelocular disc pores in the anterior pore band rather than two as in *L. africana* (Williams & Kosztarab, 1970).

POSSIBLE INTER-RELATIONSHIPS OF THE SPECIES

At present thirteen species of the genus *Lecanodiaspis* Targioni-Tozzetti are known from Ethiopian Africa. Their known distribution is biased towards the southern end of the continent (Text-fig. 14), for only three of these species have been recorded north of the Zambezi River, the rest occurring mainly in South Africa. This may be partly due to the more intensive collecting in southern Africa, but as members of each of the groups discussed below are found in South Africa, it is probable that the main centre for this genus in Africa lies in the south.

These species fall into three well-defined groups:

Group I: <i>L. brabei</i> Brain	}	}	*
<i>L. elytropappi</i> Munting & Giliomee			
<i>L. erica</i> Hodgson			
<i>L. tarsalis</i> Newstead			
<i>L. dorsospinosa</i> Hodgson	}	}	*

The main characters of this group are described under *L. brabei* (p. 422). These species are found mainly in South Africa, except *L. tarsalis*, which is also known to be

* The brackets indicate the degree of closeness of the species in each group.

a minor pest of nursery stock in Rhodesia; these plants are imported mainly from South Africa, and hence it seems probable that *L. tarsalis* has spread from the south.

Group II: *L. erratica* De Lotto }
 L. natalensis Brain }
 L. brachystegiae Hall }
 L. mimosae (Maskell) }
 L. parinari Hall } *

This group has a number of common characters not shared with the other groups, but is not as uniform as group I. These characters are discussed mainly under *L.*

* The brackets indicate the degree of closeness of the species in each group.



FIG. 14. Map showing the distribution of the species of *Lecanodiaspis* Targioni-Tozzetti in the Ethiopian Region.

erratica (p. 433), *L. mimosae* (p. 438) and *L. parinari* (p. 442). This group is also mainly from southern Africa, except *L. erratica*, which has only been recorded from cultivated coffee in Kenya, where it is a minor pest. The genus *Coffea* is widespread in Africa, and hence *L. erratica* may be more widely distributed than the records suggest.

Group III: *L. africana* Newstead }
L. magna Brain }*
L. zygothylli Hodgson }

The main features of this group are given under *L. africana*, which is a minor pest in north Africa and in the eastern Mediterranean countries. *L. magna* and *L. zygothylli* are known only from their type-localities at opposite ends of the continent. Thus, the main centre of this group is hard to define, but it may not be in the south.

These species have been recorded from a wide range of plant families. Although there is a tendency for closely related species to be found on closely related plant families, conclusive evidence for this relationship is lacking.

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EXPLANATION OF THE FIGURES

Each plate represents the adult female, with the main features of the dorsal surface on the left side of the central drawing, and those of the ventral surface on the right. The key to the lettering is as follows: A, larger or only type of dorsal 8-shaped pore; B, smaller dorsal 8-shaped pore; C, dorsal minute simple pore; D, Di, Dii, dorsal setae; E, cribriform plates; F, dorsal tubular ducts; G, Gi, Gii, Giii, stigmatic spines; H, anal cleft, with anal plate, dorsal plate and posterior lobes with their setae; J, multilocular disc pore; K, quinquelocular disc pore; Li, Lii, ventral tubular ducts (generally only part of Lii is illustrated, but the ductules are usually about the same length as those of Li); M, ventral minute simple pore; N, ventral square-shaped pore;

* The brackets indicate the degree of closeness of the species in each group.

O, ventral submarginal setae; P, ventral 8-shaped pore; Q, marginal seta; R, whole or portion of metathoracic (iii) limb; S, entire antenna; T, labium; X, anal opening.

The lengths of the scale-lines are as follows. A-F and J-Q = 3 μ , with the following exceptions: Text-fig. 3, E = 20 μ ; Text-fig. 10, M = 1 μ ; Text-fig. 12 F, L and Q = 5 μ . G, H, R, S, T and X = 25 μ , except for Text-figs 3, 4, 7, 9, 10 and 11, in which these scale-lines = 20 μ , and Text-fig. 12, in which G and X = 5 μ , and H, R, S and T = 50 μ .

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INDEX TO SPECIFIC NAMES

Figures in *italics* indicate page where species is described, and those in **bold** where it is figured.

- africana*, 413, 416, **417**, 418, 435, 447, 448, 449.
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